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THE TRANSACTIONS

OF THE

MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH.

VOL. XIII.—NEW SERIES.

SESSION 1893-94.

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PREFACE.

THE present Volume is the *Thirteenth* of the *New Series*, and contains a record of the work done during the past Session.

That work, as hitherto, embraces the communication of Original Papers; the exhibition of Patients, illustrating rare and interesting forms of disease; and the exhibition of Pathological and other Specimens, so essential to the proper understanding of the morbid changes which take place in the human body.

During the past Session Extra Meetings were held for the purpose of having Discussions on Special Subjects. The first Special Discussion was on "Intra-cranial Surgery," and occupied three nights. The Discussion was opened by Professor Annandale from the *Surgical* aspect, followed by Sir T. Grainger Stewart from the *Medical* aspect. The second Special Discussion was on "Massage as an Adjuvant to Medical, Surgical, and Gynæcological Practice," and was opened by Dr J. Halliday Croom. It is hoped that such Meetings will materially increase the usefulness of the Society.

It is believed that the publication of the Transactions in this permanent form will prove a valuable contribution to medical literature, will encourage the Members to take a more active part in the work of the Society, and will tend in no small degree to increase the influence and usefulness of the Medico-Chirurgical Society of Edinburgh.

WILLIAM CRAIG,
Editor.

October 1894.

Medico-Chirurgical Society of Edinburgh.

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	John Macdonald Brown, M.B., F.R.C.S. Eng. & Ed., 12 Cumin Place,	1883
115	James William Beeman Hodsdon, M.D., F.R.C.S. Ed., 52 Melville Street, *Secretary*,	1883
	Thomas Francis Spittal Caverhill, M.B., F.R.C.P. Ed., 8A Abercromby Place,	1883
	* Robert Alexander Lundie, M.B., B.Sc., F.R.C.S. Ed., 55A Grange Road,	1883
	Alexander Black, M.B., F.R.C.P. Ed., 13 Howe Street,	1883
	* Harry Melville Dunlop, M.D., F.R.C.P. Ed., 20 Abercromby Place,	1883
120	* George Andreas Berry, M.B., F.R.C.S. Ed., 31 Drumsheugh Gardens,	1883
	Hamilton Wylie, M.B., C.M., 1 George Place,	1883
	Arthur Douglas Webster, M.D., F.R.C.P. Ed., Belleville Lodge, S. Blacket Place,	1883
	* Robert William Philip, M.D., F.R.C.P. Ed., 4 Melville Crescent,	1883
	William Russell, M.D., F.R.C.P. Ed., 46 Albany Street, *Secretary*,	1884
125	George Dickson, M.D., F.R.C.S. Ed., 9 India Street,	1884
	* Alexander Thom, M.D., C.M., Crieff,	1884
	Hugh Logan Calder, M.D., C.M., 60 Leith Walk,	1884
	T. Goodall Nasmyth, M.D., D.Sc., Cupar-Fife,	1884
	Henry Hay, M.B., C.M., 7 Brandon Street,	1884
130	Thomas R. Scott, M.D., C.M., Musselburgh,	1884
	R. Milne Murray, M.B., F.R.C.P. Ed., 10 Hope Street,	1884
	A. S. Cumming, M.D., F.R.C.P. Ed., 18 Ainslie Place,	1884
	John Mowat, M.D., 1 Hope Park Terrace,	1885
	D. Noël Paton, M.D., F.R.C.P. Ed., 7 Lauriston Lane,	1885
135	Michael Dewar, M.D., C.M., 24 Lauriston Place,	1885
	Edward M'Callum, F.R.C.S. Ed., 3 Brandon Street,	1885
	John Struthers Stewart, L.R.C.P. & S. Ed., 15 Merchiston Pl.,	1885
	Allen Thomson Sloan, M.D., C.M., 22 Forth Street,	1885
	John William Ballantyne, M.D., F.R.C.P. Ed., 24 Melville St.,	1885
140	James Robertson Crease, F.R.C.S. Ed., 2 Ogle Terrace, South Shields,	1885
	George Kerr, M.B., C.M., 6 St Colme Street,	1885
	David Milligan, M.B., C.M., 11 Palmerston Place,	1885
	J. Murdoch Brown, M.B., F.R.C.P. Ed., 9 Walker Street,	1885
	Robert W. Felkin, M.D., F.R.C.S. Ed., 8 Alva Street,	1885
145	James Haig Ferguson, M.D., F.R.C.P. Ed., M.R.C.S. Eng., 25 Rutland Street,	1885
	Charles Kennedy, M.D., C.M., 43 Minto Street,	1886
	Reginald Ernest Horsley, M.D., F.R.C.S. Ed., Kirkmay House, Crail, Fife,	1886
	James Mill, M.B., F.R.C.P. Ed., 172 Ferry Road,	1886
	Robert Fraser Calder Leith, M.B., B.Sc., F.R.C.P. Ed., 20 Merchiston Terrace,	1886
150	Thomas M. Burn-Murdoch, M.B., C.M., 31 Morningside Road,	1886

		Date of Admission
	Professor William Smith Greenfield, M.D., F.R.C.P. Lond. and Ed., 7 Heriot Row,	1886
	Nathaniel Thomas Brewis, M.B., F.R.C.P. Ed., 23 Rutland St.,	1886
	John Batty Tuke, jr., M.D., F.R.C.P. Ed., Balgreen, Murrayfield,	1886
	David Berry Hart, M.D., F.R.C.P. Ed., 29 Charlotte Square,	1886
155	Robert S. Aitchison, M.B., F.R.C.P. Ed., 74 Great King St.,	1887
	J. Walton Hamp, L.F.P.S. Glasg., L.S.A. Lond., Wolverhampton,	1887
	John Thomson, M.D., F.R.C.P. Ed., 14 Coates Crescent,	1887
	T. Brown Darling, M.D., C.M., 13 Merchiston Place,	1887
	John Keay, M.B., F.R.C.P. Ed., Asylum, Inverness,	1887
160	John F. Sturrock, M.B., C.M., Homewood, Broughty Ferry,	1887
	Edward Carmichael, M.D., M.R.C.P. Ed., 21 Abercromby Pl.,	1887
	Charles C. Teacher, M.B., C.M., 16 Newington Road,	1887
	David W. Aitken, M.B., C.M., 17 Hatton Place,	1887
	Robert Inch, M.B., C.M., Gorebridge,	1887
165	John Shaw M'Laren, M.B., F.R.C.S. Ed., 14 Walker Street,	1887
	George Mackay, M.D., F.R.C.S. Ed., M.R.C.S. Eng., 2 Randolph Place,	1887
	Henry Alexis Thomson, M.D., F.R.C.S. Ed., 2 Coates Crescent,	1887
	David Wallace, M.B., F.R.C.S. Ed., 66 Northumberland Street,	1887
	John C. Messer, M.D., R.N., 15 Belgrave Place,	1887
170	James Lockhart Wilson, M.B., C.M., Duns,	1888
	William Booth, F.R.C.S. Ed., 2 Minto Street,	1888
	Thomas Russell, M.B., C.M., 27A Westmuir Street, Parkhead, Glasgow,	1888
	George M. Johnston, M.D., C.M., 9 Morton Street, Leith,	1888
	George Pirrie Boddie, M.B., C.M., 147 Bruntsfield Place,	1888
175	Kenneth Mackinnon Douglas, M.D., F.R.C.S. Ed., 26 Rutland Street,	1888
	George Lovell Gulland, M.D., F.R.C.P. Ed., 6 Alva Street,	1888
	William Burns Macdonald, M.B., C.M., Port Lodge, Dunbar,	1888
	William Haldane, M.D., F.F.P.S. Glasg., Viewforth, Bridge of Allan,	1889
	John Hugh Alex. Laing, M.B., C.M., 11 Melville Street,	1889
180	Harold Jalland Stiles, M.B., F.R.C.S. Ed., 5 Castle Terrace,	1889
	John Smith, M.D., M.R.C.S. Eng., Brycehall, Kirkcaldy,	1889
	Allan Cuthbertson Sym, M.D., C.M., 144 Morningside Road,	1889
	Edmund Frederick Tanney Price, M.B., C.M., 1 Middleby St.,	1889
	William George Sym, M.D., F.R.C.S. Ed., 50 Queen Street,	1889
185	Benjamin D. C. Bell, L.R.C.P. & S. Ed., Kirkwall,	1889
	A. Home Douglas, M.B., F.R.C.P. Ed., 4 Palmerston Place,	1889
	Alexander John Keiller, L.R.C.P. & S. Ed., 54 Northumberland Street,	1889
	G. Keppie Paterson, M.B., M.R.C.P. Ed., 17 Forth Street,	1889
	William Stewart, M.D., F.F.P.S. Glasg., 146 Ferry Rd., Leith,	1889
190	Thomas Proudfoot, M.B., F.R.C.P.Ed., 13 Lauriston Place,	1889
	Professor William H. Barrett, M.B., C.M., 21 Learmonth Ter.,	1890
	Dawson Fyers Duckworth Turner, M.D., F.R.C.P. Ed., 37 George Square,	1890
	Edward Farr Armour, M.B., C.M., 149 Bruntsfield Place,	1890
	James Hunter, M.D., C.M., Linlithgow,	1890
195	William Guy, F.R.C.S. Ed., 11 Wemyss Place,	1890
	William Smith, L.R.C.P. & S. Ed., L.F.P.S. Glasg., 14 Hartington Gardens,	1890
	Robert A. Fleming, M.B., F.R.C.P. Ed., 36 Drumsheugh Gardens,	1890
	Robert Thin, M.B., F.R.C.P. Ed., 38 Albany Street,	1890
	George M. Robertson, M.B., F.R.C.P. Ed., Morningside Royal Asylum,	1890
200	James Hutcheson, M.D., F.R.C.S. Ed., 44 Moray Place,	1890
	A. Cowan Guthrie, M.B., C.M., Swanville, Newhaven Road,	1890

		Date of Admission.
	Ralph Stockman, M.D., F.R.C.P. Ed., 12 Hope Street,	1891
	Alex. Lockhart Gillespie, M.D., F.R.C.P. Ed., 23 Walker St.,	1891
	Stewart Stirling, M.D., F.R.C.S. Ed., 4 Coates Crescent,	1891
205	Francis D. Boyd, M.D., F.R.C.P. Ed., 6 Atholl Place,	1891
	J. J. Douglas, M.D., M.R.C.P. Ed., 22 Drummond Place,	1891
	J. Y. Simpson Young, M.B., C.M., 14 Ainslie Place,	1891
	John Macpherson, M.D., F.R.C.P. Ed., Stirling District Asylum, Larbert,	1891
	James Smith, M.B., C.M., 1 Parson's Green Terrace,	1891
210	Norman Purvis Walker, M.D., F.R.C.P. Ed., 7 Manor Place,	1891
	Charles Templeman, M.D., C.M., 8 Airlie Place, Dundee,	1891
	Simson C. Fowler, M.B., C.M., Juniper Green,	1892
	Alexander Miles, M.D., F.R.C.S. Ed., 23 George Square,	1892
	Robert Abernethy, M.D., F.R.C.P. Ed., 18 Alva Street,	1892
215	Robert Dundas Helm, M.D., C.M., 3 Alfred Street, North Portland Square, Carlisle,	1892
	Arthur Logan Turner, M.D., F.R.C.S. Ed., 19 Rutland Street,	1892
	T. Herbert Littlejohn, M.B., F.R.C.S. Ed., 24 Royal Circus,	1892
	G. Matheson Cullen, M.D., C.M., 48 Lauriston Place,	1892
	Wm. Gordon Woodrow Sanders, M.B., C.M., F.R.C.P. Ed., 15 Alva Street,	1892
220	William George Aitchison Robertson, M.D., F.R.C.P. Ed., 26 Minto Street,	1892
	David Middleton Greig, M.B., C.M., F.R.C.S. Ed., 25 Tay Street, Dundee,	1892
	John Stevens, M.D., F.R.C.P. Ed., 3 Shandon Crescent,	1892
	James Crawfurd Dunlop, M.B., F.R.C.P. Ed., M.R.C.S. Eng., 24 Stafford Street,	1892
	William Elder, M.B., M.R.C.P. Ed., 4 John's Place, Leith,	1892
225	Ernest Coleman Moore, M.B., C.M., 2 Coates Place,	1892
	Robert Stewart, M.B., C.M., 42 George Square,	1892
	William Crawford M'Ewan, M.D., C.M., Prestonpans,	1892
	George R. Wilson, M.B., C.M., Royal Edinburgh Asylum,	1892
	Richard J. Erskine Young, M.D., C.M., 14 Ainslie Place,	1892
230	Richard James Arthur Berry, M.B., C.M., Ramsay Lodge,	1893
	William Brendon Thompson Gubbin, M.D., C.M., Selville, Portobello,	1893
	W. B. Mackay, M.B., M.R.C.S., 18 Quay Walls, Berwick-on-Tweed,	1893
	John MacRae, M.D., C.M., Lynwood, Murrayfield,	1893
	Alex. Mitchell Stalker, M.D., C.M., 140 Nethergate, Dundee,	1893
235	James Harvey, M.B., C.M., 1 Leopold Place,	1893
	D. W. Johnston, F.R.C.S. Ed., Johannesburg, So. Africa,	1893
	Henry Anderson Peddie, M.B., C.M., 24 Palmerston Place,	1893
	Frank Ashby Elkins, M.D., C.M., Royal Edinburgh Asylum,	1893
	John Wheeler Dowden, M.B., C.M., Lynn House, Gillsland Road,	1893
240	Alexander Bruce Giles, M.B., C.M., 1 Kew Terrace,	1893
	Thomas Lawson, M.B., C.M., 16 Dean Terrace,	1893
	William Basil Orr, M.D., C.M., 13 Braid Road,	1893
	James Aitken Clark, M.B., C.M., 4 Cambridge Street,	1893
	Philip Grierson Borrowman, M.B., C.M., Elie, Fife,	1893
245	Robert Mackenzie, M.D., C.M., Napier Villa, Merchiston,	1893
	William Ford Robertson, M.B., C.M., Royal Asylum, Morningside,	1893
	James Mowat, M.B., C.M., 1 Priestfield Road,	1893
	William Simmers, M.B., C.M., Denburn, Crail, Fife,	1894
	Charles Arthur Sturrock, M.B., F.R.C.S. Ed., 15 Regent Ter.,	1894
250	Frederick Maurice Graham, L.R.C.P. & S. Ed., Cowgate Dispensary,	1894
	Claude B. Ker, M.B., C.M., 4 Howard Place,	1894
	William Craig, M.B., C.M., Cowdenbeath, Fife,	1894

		Date of Admission
	Robert Muir, M.D., M.R.C.P. Ed., 20 Hartington Place,	1894
	John Cumming, L.R.C.P. & S. Ed., 94 Gilmore Place,	1894
255	William Fraser Wright, M.B., C.M., Bonnington Mount, Bonnington Terrace,	1894
	Douglas Chalmers Watson, M.B., C.M., 8 Brougham Place,	1894

NON-RESIDENT.

	W. Ord M'Kenzie, M.D., L.R.C.S. Ed., *London*,	1845
	W. Judson Van Someren, M.D., L.R.C.S. Ed., *Redhill, Surrey*,	1845
	William H. Lowe, M.D., F.R.C.P. Ed., *Wimbledon*,	1845
260	George Skene Keith, M.D., F.R.C.P. Ed., *Currie*,	1845
	Archibald Hall, M.D., *Montreal*,	1853
	Sir W. Overend Priestley, M.D., LL.D., F.R.C.P. Ed., *London*,	1854
	Horatio Robinson Storer, M.D., *Newport, Rhode Island, U.S.*,	1855
	James C. Howden, M.D., *Montrose*,	1856
265	Thomas Skinner, M.D., L.R.C.S. Ed., *London*,	1856
	Professor William Smoult Playfair, M.D., LL.D., F.R.C.P.L., *London*,	1857
	J. Ivor Murray, M.D., F.R.C.S. Ed., *Scarboro'*,	1857
	Andrew Scott Myrtle, M.D., L.R.C.S. Ed., *Harrogate*,	1859
	Francis Robertson Macdonald, M.D., *Inveraray*,	1860
270	Professor John Young, M.D., *University of Glasgow*,	1860
	George Thin, M.D., L.R.C.S. Ed., *London*,	1861
	Professor William Stephenson, M.D., F.R.C.S. Ed., *Aberdeen*,	1861
	J. S. Beveridge, M.R.C.P. Lond., F.R.C.S. Ed., *Lochinver*,	1861
	David Yellowlees, M.D., LL.D., F.F.P.S. Glasg., *Glasgow*,	1862
275	Prof. Arthur Gamgee, M.D., F.R.C.P. Ed., F.R.S., *Davos and Carlsbad*,	1863
	Professor John Cleland, M.D., LL.D., *The University, Glasgow*,	1864
	R. B. Finlay, M.D., Q.C., *Middle Temple, London*,	1864
	Stanley Lewis Haynes, M.D., M.R.C.S. Eng., *Malvern*,	1864
	James Watt Black, M.D., F.R.C.P.L., *London*,	1865
280	David Brodie, M.D., *London*,	1865
	Peter Maury Deas, M.B., L.R.C.S. Ed., *Exeter*,	1868
	Professor J. G. M'Kendrick, M.D., LL.D., F.R.C.P. Ed., *University, Glasgow*,	1870
	Professor Lawson Tait, M.D., F.R.C.S. Ed. & Eng., LL.D., *Birmingham*,	1870
	J. G. Sinclair Coghill, M.D., F.R.C.P. Ed., *Ventnor*,	1870
285	James Johnston, M.D., F.R.C.S. Ed., *London*,	1871
	J. William Eastwood, M.D., M.R.C.P.L., *Darlington*,	1871
	Strethill H. Wright, M.D., M.R.C.P. Ed., *Monmouth*,	1871
	Charles A. E. Sheaf, F.R.C.S. Ed., *Queensland*,	1871
	Professor J. Bell Pettigrew, M.D., LL.D., F.R.C.P. Ed., *University of St Andrews*,	1873
290	J. Johnson Bailey, M.D., F.R.C.S. Ed., *Marple*,	1874
	John Aymers Macdougall, M.D., F.R.C.S. Ed., *France*,	1875
	Thomas John Maclagan, M.D., M.R.C.P.L., *London*,	1875
	Dr Groesbeck, *Cincinnati*,	1875
	Professor David James Hamilton, M.B., F.R.C.S. Ed., *Aberdeen University*,	1876
295	J. Moolman, M.B., C.M., *Cape of Good Hope*,	1877
	Robert Somerville, M.D., F.R.C.S. Ed., *Galashiels*,	1877
	Graham Steell, M.D., F.R.C.P.L., *Manchester*,	1877
	Frederick William Barry, M.D., D.Sc., *London*,	1878
	John Brown, M.D., F.R.C.S. Eng., *Burnley*,	1878
300	James Allan Philip, M.D., *Boulogne-Sur-Mer*,	1878
	Alex. Robert Coldstream, M.D., F.R.C.S. Ed., *Florence*,	1878
	Professor Johnson Symington, M.D., F.R.C.S. Ed., M.R.C.S. Eng., *Belfast*,	1878

		Date of Admission.
	A. D. Leith Napier, M.D., M.R.C.P.L., *London*,	1879
	Keith Norman Macdonald, M.D., F.R.C.P. Ed., *Skye*,	1880
305	John Home-Hay, M.D., M.R.C.S. Eng., *Alloa*,	1880
	John Mackay, M.D., L.R.C.S. Ed., *Aberfeldy*,	1881
	J. Maxwell Ross, M.B., F.R.C.S. Ed., *Dumfries*,	1882
	F. W. Dyce Fraser, M.D., F.R.C.P. Ed., *Hawthornden*,	1883
	Edwin Baily, M.B., C.M., *Oban*,	1883
310	William Hy. Shirreff, M.B., C.M., *Melbourne*,	1883
	John Haddon, M.D., C.M., *Canonbie*,	1883
	Professor A. W. Hare, M.B., F.R.C.S. Ed., M.R.C.S. Eng.,	1883
	G. Sims Woodhead, M.D., F.R.C.P. Ed., *London*,	1883
	F. A. Saunders, F.R.C.S. Ed., *Grahamstown, South Africa*,	1884
315	Joseph Carne Ross, M.D., F.R.C.P. Ed., *Withington*,	1884
	G. J. H. Bell, M.B., C.M., *Bengal Army*,	1884
	W. C. Greig, M.B., C.M., *Morocco*,	1884
	J. Craig Balfour, L.R.C.P. & S. Ed., *Belford*,	1884
	T. Wyld Pairman, L.R.C.P. & S. Ed., *New Zealand*,	1884
320	Andrew Brown, M.D., M.R.C.P. Ed., *London*,	1884
	Ernest F. Neve, M.D., F.R.C.S. Ed., M.R.C.S. Eng., *India*,	1884
	T. Edgar Underhill, M.D., F.R.C.S. Ed., *Bromsgrove*,	1885
	S. Hale Puckle, M.B., C.M., *Bishop's Castle*,	1885
	Skene Keith, M.B., F.R.C.S. Ed., *London*,	1885
325	G. Hugh Mackay, M.B., C.M., *Elgin*,	1885
	Oswald Gillespie Wood, M.D., F.R.C.S. Ed., Surgeon, *A. M. Staff, India*,	1886
	James Hogarth Pringle, M.B., C.M., *Glasgow*,	1886
	Walter Scott Lang, M.D., F.R.C.S. Ed., *Edinburgh*,	1886
	William Gayton, M.D., M.R.C.S. Eng., *London*,	1886
330	A. Bell Whitton, M.B., C.M., *Aberchirder*,	1886
	William Hunter, M.D., M.R.C.S. Eng., M.R.C.P.L., *London*,	1887
	Sydney Rumboll, L.R.C.P. Ed., F.R.C.S. Ed., *Leeds*,	1887
	George Franklin Shiels, M.D., F.R.C.S. Ed., *San Francisco*,	1887
	D. H. Anderson, M.D., C.M., *St Margaret's, Twickenham*,	1887
335	J. A. Armitage, M.D., C.M., *Wolverhampton*,	1887
	Professor John M'Fadyean, M.B., C.M., *London*,	1888
	James W. Martin, M.D., F.R.C.P. Ed., *London*,	1888
	J. R. Home Ross, M.B., F.R.C.P. Ed., *Burmah*,	1888
	H. Harvey Littlejohn, M.B., F.R.C.S. Ed., *Sheffield*,	1889
340	Surgeon-Captain C. H. Bedford, M.D., M.R.C.S. Eng., *Bengal Army*,	1889
	D. C. Braidwood, M.B., C.M., *Halkirk, Caithness*,	1889
	Professor J. Berry Haycraft, M.D., D.Sc., *Cardiff*,	1889
	Professor A. W. Hughes, M.B., F.R.C.S. Ed., M.R.C.S. Eng., *Cardiff*,	1889
	Hugh Jamieson, M.B., C.M., 13 Lauriston Place,	1889
345	Albert E. Morison, M.B., F.R.C.S. Ed., M.R.C.S. Eng., *Hartlepool*,	1889
	Robert Stirling, M.B., C.M., *Perth*,	1891
	William Towers-Smith, M.R.C.S. Eng., *London*,	1892
	W. Ramsay Smith, M.B., C.M., *Rhyl*,	1892
	Alexander Peyer, M.D., *Zürich*,	1893
350	Alexander Reid Urquhart, M.D., M.R.C.P. Ed., *Perth*,	1893
	F. W. Foxcroft, M.B., C.M., *Wilmslow*,	1893
	James Mackenzie, M.D., C.M., *Burnley*,	1894
353	Charles E. Douglas, M.D., C.M., *Cupar-Fife*,	1894

ORDINARY MEMBERS.

ARRANGED ALPHABETICALLY.

	RESIDENT.	Date of Admission.
	Dr R. Abernethy, 18 Alva Street,	1892
	Dr J. O. Affleck, 38 Heriot Row,	1871
	Dr R. S. Aitchison, 74 Great King Street,	1887
	Dr D. Aitken, 17 Hatton Place,	1887
5	Dr James Andrew, 2 Atholl Crescent,	1869
	Professor Annandale, 34 Charlotte Square,	1863
	Dr Archibald, 2 The Avenue, Beckenham, Kent,	1882
	Dr E. F. Armour, 149 Bruntsfield Place,	1890
	Dr W. Badger, Penicuik,	1882
10	Dr Andrew Balfour, Portobello,	1874
	Dr J. H. Balfour, Portobello,	1881
	Dr G. W. Balfour, 17 Walker Street,	1874
	Dr Thomas Balfour, 51 George Square,	1856
	Dr Alexander Ballantyne, Dalkeith,	1872
15	Dr J. W. Ballantyne, 24 Melville Street,	1885
	Dr A. H. Freeland Barbour, 4 Charlotte Square,	1881
	Professor W. H. Barrett, 21 Learmonth Terrace,	1890
	Dr Benjamin D. C. Bell, Kirkwall,	1889
	Joseph Bell, Esq., 2 Melville Crescent,	1862
20	G. H. Bentley, Esq., Kirkliston,	1877
	Dr G. A. Berry, 31 Drumsheugh Gardens,	1883
	Dr R. J. A. Berry, Ramsay Lodge,	1893
	Dr Alexander Black, 13 Howe Street,	1883
	Dr W. T. Black, 2 George Square,	1877
25	Dr Robert H. Blaikie, 42 Minto Street,	1883
	Dr Bleloch, 2 Lonsdale Terrace,	1871
	Dr G. P. Boddie, 147 Bruntsfield Place,	1888
	William Booth, Esq., 2 Minto Street,	1888
	Dr P. G. Borrowman, Elie, Fife,	1893
30	Dr F. D. Boyd, 6 Atholl Place,	1891
	Dr Brakenridge, 10 St Colme Street,	1865
	Dr Byrom Bramwell, 23 Drumsheugh Gardens,	1876
	Dr N. T. Brewis, 23 Rutland Street,	1886
	Dr J. Graham Brown, 3 Chester Street,	1878
35	Dr J. Macdonald Brown, 12 Cumin Place,	1883
	Dr J. Murdoch Brown, 9 Walker Street,	1885
	Dr Alexander Bruce, 13 Alva Street,	1883
	Dr Buist, 1 Clifton Terrace,	1877
	Dr T. M. Burn-Murdoch, 31 Morningside Road,	1886
40	Dr Cadell, 22 Ainslie Place,	1870
	Dr Francis M. Caird, 21 Rutland Street,	1883
	Dr H. L. Calder, 60 Leith Walk,	1884
	Dr W. Watson Campbell, Duns,	1877
	Dr Cappie, 37 Lauriston Place,	1855
45	Dr Edward Carmichael, 21 Abercromby Place,	1887
	Dr J. Carmichael, 22 Northumberland Street,	1870
	Dr C. W. Cathcart, 8 Randolph Crescent,	1883
	Dr T. F. S. Caverhill, 8A Abercromby Place,	1884
	Professor John Chiene, 26 Charlotte Square,	1867
50	Dr J. A. Clark, 4 Cambridge Street,	1893
	Dr Church, 36 George Square,	1876
	Dr Clouston, Tipperlinn House, Morningside Place, *President*,	1861
	Dr John Connel, Peebles,	1876
	Dr Cotterill, 24 Manor Place,	1878
55	Dr William Craig, 71 Bruntsfield Place,	1869
	Dr William Craig, Cowdenbeath, Fife,	1894
	Dr J. R. Crease, 2 Ogle Terrace, South Shields,	1885
	Dr Halliday Croom, 25 Charlotte Square,	1870

		Date of Admission.
	Dr G. Matheson Cullen, 48 Lauriston Place,	1892
60	Dr A. S. Cumming, 18 Ainslie Place,	1884
	Dr John Cumming, 94 Gilmore Place,	1894
	Dr R. J. B. Cunynghame, 18 Rothesay Place, *Vice-President*,	1868
	Dr T. B. Darling, 13 Merchiston Place,	1887
	Dr M. Dewar, 24 Lauriston Place,	1885
65	Dr Archibald Dickson, Hartree House, Biggar,	1871
	Dr George Dickson, 9 India Street,	1884
	Dr Halliday Douglas, 30 Melville Street,	1842
	Dr A. Home Douglas, 4 Palmerston Place,	1889
	Dr J. J. Douglas, 22 Drummond Place,	1891
70	Dr Kenneth M. Douglas, 26 Rutland Street,	1888
	Dr William B. Dow, Dunfermline,	1879
	Dr J. W. Dowden, Lynn House, Gillsland Road,	1893
	Dr John Duncan, 8 Ainslie Place,	1868
	Dr Kirk Duncanson, 22 Drumsheugh Gardens,	1871
75	Dr H. M. Dunlop, 20 Abercromby Place,	1883
	Dr J. C. Dunlop, 24 Stafford Street,	1892
	Dr J. Dunsmure, 53 Queen Street,	1872
	Dr William Elder, 4 John's Place, Leith,	1892
	Dr F. A. Elkins, Royal Edinburgh Asylum,	1893
80	Dr R. W. Felkin, 8 Alva Street,	1885
	Dr J. Haig Ferguson, 25 Rutland Street,	1885
	Dr W. A. Finlay, St Helen's, Russell Place, Trinity,	1875
	Dr Andrew Fleming, 8 Napier Road,	1880
	Dr R. A. Fleming, 36 Drumsheugh Gardens,	1890
85	Dr Foulis, 34 Heriot Row,	1875
	Dr Simson C. Fowler, Juniper Green,	1892
	Dr John Fraser, 19 Strathearn Road,	1878
	Professor Thomas R. Fraser, 13 Drumsheugh Gardens,	1865
	Dr R. Freeland, Broxburn,	1879
90	Dr Garland, 53 Charlotte Street, Leith,	1873
	Dr G. A. Gibson, 17 Alva Street,	1880
	Dr A. B. Giles, 1 Kew Terrace,	1893
	Dr A. Lockhart Gillespie, 23 Walker Street,	1891
	G. R. Gilruth, Esq., 48 Northumberland Street,	1869
95	Dr F. M. Graham, Cowgate Dispensary,	1894
	Dr J. Allan Gray, 107 Ferry Road,	1879
	Professor Greenfield, 7 Heriot Row,	1886
	Dr David Greig, 38 Coates Gardens,	1854
	Dr David M. Greig, 25 Tay Street, Dundee,	1892
100	Dr W. B. T. Gubbin, Selville, Portobello,	1893
	Dr G. L. Gulland, 6 Alva Street,	1888
	His Excellency Dr R. H. Gunning, 12 Addison Crescent, West Kensington, London, W.,	1846
	Dr A. C. Guthrie, Swanville, Newhaven Road,	1890
	Dr William Guy, 11 Wemyss Place,	1890
105	Dr William Haldane, Viewforth, Bridge of Allan,	1889
	Dr J. W. Hamp, Wolverhampton,	1887
	Dr D. Berry Hart, 29 Charlotte Square,	1886
	Dr James Harvey, 1 Leopold Place,	1893
	Dr Henry Hay, 7 Brandon Street,	1884
110	Dr R. Dundas Helm, 3 Alfred Street North, Portland Square, Carlisle,	1892
	Dr John Henderson, 7 John's Place, Leith,	1848
	Dr J. W. B. Hodsdon, 52 Melville Street,	1883
	Dr R. E. Horsley, Kirkmay House, Crail, Fife,	1886
	Dr George Hunter, 33 Palmerston Place,	1876
115	Dr James Hunter, St Catherine's, Linlithgow,	1890
	Dr Husband, 4 Royal Circus,	1849
	Dr J. Hutcheson, 44 Moray Place,	1890
	Dr Robert Inch, Gorebridge,	1887

		Date of Admission.
	Dr W. Wotherspoon Ireland, Mavisbush, Polton, Midlothian,	1883
120	Dr James, 10 Melville Crescent,	1877
	Dr Allan Jamieson, 35 Charlotte Square,	1876
	Dr James Jamieson, 43 George Square,	1877
	Dr D. W. Johnston, P.O. Box 2022, Johannesburg, So. Africa,	1893
	Dr G. M. Johnston, 9 Morton Street, Leith,	1888
125	Dr R. M'Kenzie Johnston, 44 Charlotte Square, *Treasurer*,	1883
	Dr J. Carlyle Johnstone, Melrose Asylum, Melrose,	1882
	Dr J. Keay, Asylum, Inverness,	1887
	Dr A. J. Keiller, 54 Northumberland Street,	1889
	Dr C. Kennedy, 43 Minto Street,	1886
130	Dr C. B. Ker, 4 Howard Place,	1894
	Dr George Kerr, 6 St Colme Street,	1885
	Dr J. H. A. Laing, 11 Melville Street,	1889
	Dr Robert Lawson, 24 Mayfield Terrace,	1881
	Dr Thomas Lawson, 16 Dean Terrace,	1893
135	Dr R. F. C. Leith, 20 Merchiston Terrace,	1886
	Dr Linton, 60 George Square,	1863
	Dr Littlejohn, 24 Royal Circus,	1853
	Dr Herbert Littlejohn, 24 Royal Circus,	1892
	Dr Lucas, Dalkeith,	1875
140	Dr R. A. Lundie, 55A Grange Road,	1883
	Dr P. M'Bride, 16 Chester Street,	1879
	Dr E. M'Callum, 3 Brandon Street,	1885
	Dr W. Burn Macdonald, Port Lodge, Dunbar,	1888
	Dr William C. M'Ewan, Prestonpans,	1892
145	John M'Gibbon, Esq., 55 Queen Street,	1868
	Dr MacGillivray, 11 Rutland Street,	1877
	Dr G. Mackay, 2A Gilmore Place,	1878
	Dr George Mackay, 2 Randolph Place,	1887
	Dr W. B. Mackay, 18 Quay Walls, Berwick-on-Tweed,	1893
150	Dr Robert Mackenzie, Napier Villa, Merchiston,	1893
	Professor Sir Douglas Maclagan, 28 Heriot Row,	1834
	Dr J. S. M'Laren, 14 Walker Street,	1887
	Dr P. H. Maclaren, 1 Drumsheugh Gardens,	1868
	Dr Roderick M'Laren, 23 Portland Square, Carlisle,	1882
155	Dr John Macpherson, Stirling District Asylum, Larbert,	1891
	Dr John Macrae, Lynwood, Murrayfield,	1893
	Dr A. Matthew, Corstorphine,	1882
	Dr D. Menzies, 20 Rutland Square,	1878
	Dr J. C. Messer, 15 Belgrave Place,	1887
160	Dr A. Miles, 23 George Square,	1892
	Dr J. Mill, 172 Ferry Road,	1886
	A. G. Miller, Esq., 7 Coates Crescent,	1867
	Dr D. Milligan, 11 Palmerston Place,	1885
	Sir Arthur Mitchell, 34 Drummond Place,	1859
165	Dr Moir, 52 Castle Street,	1836
	Dr Alexander Moir, 30 Buccleuch Place,	1876
	Dr E. C. Moore, 2 Coates Place,	1892
	Dr J. Rutherford Morison, 14 Saville Row, Newcastle-on-Tyne,	1882
	Dr James Mowat, 1 Priestfield Road,	1893
170	Dr John Mowat, 1 Hope Park Terrace,	1885
	Dr Robert Muir, 20 Hartington Place,	1894
	Dr Claud Muirhead, 30 Charlotte Square, *Vice-President*,	1866
	Dr R. Milne Murray, 10 Hope Street,	1884
	Dr T. Goodall Nasmyth, Cupar-Fife,	1884
175	Dr H. Newcombe, 5 Dalrymple Crescent,	1883
	Dr P. Orphoot, 113 George Street,	1865
	Dr W. Basil Orr, 13 Braid Road,	1893
	Dr G. Keppie Paterson, 17 Forth Street,	1889
	Dr D. Noël Paton, 7 Lauriston Lane,	1885

		Date of Admission.
180	Dr Peddie, 15 Rutland Street,	1842
	Dr H. A. Peddie, 24 Palmerston Place,	1893
	Dr R. W. Philip, 4 Melville Crescent,	1883
	Dr Playfair, 5 Melville Crescent,	1874
	Dr Edmund Price, 1 Middleby Street,	1889
185	Dr T. Proudfoot, 13 Lauriston Place,	1889
	Dr Rattray, Portobello,	1874
	Dr James Ritchie, 22 Charlotte Square,	1873
	Dr R. Peel Ritchie, 1 Melville Crescent,	1862
	Dr Argyll Robertson, 18 Charlotte Square,	1861
190	Dr G. M. Robertson, Morningside Royal Asylum,	1890
	Dr William F. Robertson, Morningside Royal Asylum,	1893
	Dr W. G. A. Robertson, 26 Minto Street,	1892
	Dr Ronaldson, 3 Bruntsfield Terrace,	1877
	Dr Thomas Russell, 27A Westmuir St., Parkhead, Glasgow,	1888
195	Dr William Russell, 46 Albany Street, *Secretary*,	1884
	Professor Rutherford, 14 Douglas Crescent,	1866
	Dr Gordon Sanders, 15 Alva Street,	1892
	Dr Thomas R. Scott, Musselburgh,	1884
	Dr Andrew Semple, 10 Forres Street,	1883
200	Dr John Shand, 34 Albany Street,	1878
	Dr J. Sibbald, 3 St Margaret's Road,	1859
	Dr William Simmers, Denburn, Crail, Fife,	1894
	Professor Simpson, 52 Queen Street,	1859
	Dr A. T. Sloan, 22 Forth Street,	1885
205	Dr Andrew Smart, 35 Lauriston Place,	1865
	Dr G. D. Smith, 148 Ferry Road,	1877
	Dr James Smith, 1 Parson's Green Terrace,	1891
	Dr John Smith, 11 Wemyss Place,	1856
	Dr John Smith, Brycehall, Kirkcaldy,	1889
210	Dr William Smith, 14 Hartington Gardens,	1890
	Dr A. M. Stalker, 140 Nethergate, Dundee,	1893
	Dr John Stevens, 3 Shandon Crescent,	1892
	Professor Sir T. Grainger Stewart, 19 Charlotte Square,	1861
	Dr J. S. Stewart, 15 Merchiston Place,	1885
215	Dr Robert Stewart, 42 George Square,	1892
	Dr William Stewart, 146 Ferry Road, Leith,	1889
	Dr H. J. Stiles, 5 Castle Terrace,	1889
	Dr S. Stirling, 4 Coates Crescent,	1891
	Dr R. Stockman, 12 Hope Street,	1891
220	Dr John Strachan, Dollar,	1867
	Dr C. A. Sturrock, 15 Regent Terrace,	1894
	Dr J. F. Sturrock, Homewood, Broughty Ferry,	1887
	Dr Allan C. Sym, 144 Morningside Road,	1889
	Dr William G. Sym, 50 Queen Street,	1889
225	Dr W. Taylor, 12 Melville Street,	1871
	Dr C. C. Teacher, 16 Newington Road,	1887
	Dr C. Templeman, 8 Airlie Place, Dundee,	1891
	Dr C. H. Thatcher, 8 Melville Crescent,	1876
	Dr R. Thin, 38 Albany Street,	1890
230	Dr Alexander Thom, Crieff,	1884
	Dr Alexis Thomson, 2 Coates Crescent,	1887
	Dr John Thomson, 14 Coates Crescent,	1887
	Dr J. Stitt Thomson, Dalkeith,	1877
	Dr Batty Tuke, 20 Charlotte Square,	1864
235	Dr J. Batty Tuke, jr., Balgreen, Murrayfield,	1886
	Dr Dawson Turner, 37 George Square,	1890
	Dr Logan Turner, 19 Rutland Street,	1892
	Dr R. S. Turner, Keith,	1867
	Dr Underhill, 8 Coates Crescent,	1872
240	Dr Norman Walker, 7 Manor Place,	1891
	Dr D. Wallace, 66 Northumberland Street,	1887

		Date of Admission.
	Dr Douglas Watson, 8 Brougham Place,	1894
	Dr P. H. Watson, 16 Charlotte Square,	1856
	Dr W. Watson, 54 Mayfield Road,	1862
245	Dr A. D. Webster, Belleville Lodge, So. Blacket Place,	1883
	Dr George R. Wilson, Edinburgh Royal Asylum,	1892
	Dr J. Lockhart Wilson, Duns,	1888
	J. L. Wilson, Esq., 4 Buccleuch Place,	1883
	Dr T. D. Wilson, 10 Newington Road,	1880
250	Dr Russell E. Wood, 9 Darnaway Street,	1883
	Dr W. Fraser Wright, Bonnington Mount, Bonnington Ter.,	1894
	Dr Hamilton Wylie, 1 George Place,	1883
	Dr John Wyllie, 1 Melville Street, *Vice-President*,	1868
	Dr J. Y. Simpson Young, 14 Ainslie Place,	1891
255	Dr P. A. Young, 25 Manor Place,	1870
	Dr R. J. Erskine Young, 14 Ainslie Place,	1892

NON-RESIDENT.

	Dr D. H. Anderson, *St Margaret's, Twickenham*,	1887
	Dr J. A. Armitage, *Wolverhampton*,	1887
	Dr J. J. Bailey, *Marple, Cheshire*,	1874
260	Dr Edwin Baily, *Oban*,	1883
	Dr James Craig Balfour, *Belford*,	1884
	Dr F. W. Barry, *London*,	1878
	Surgeon-Captain C. H. Bedford, *Bengal Army*,	1889
	Dr G. J. H. Bell, *Bengal Army*,	1884
265	Dr J. S. Beveridge, *Lochinver*,	1861
	Dr J. W. Black, *London*,	1865
	Dr D. C. Braidwood, *Halkirk, Caithness*,	1889
	Dr David Brodie, *London*,	1865
	Dr Andrew Brown, *London*,	1884
270	Dr John Brown, *Burnley*,	1878
	Professor Cleland, *Glasgow*,	1864
	Dr Coghill, *Ventnor*,	1870
	Dr A. R. Coldstream, *Florence*,	1878
	Dr P. M. Deas, *Exeter*,	1868
275	Dr C. E. Douglas, *Cupar-Fife*,	1894
	Dr J. W. Eastwood, *Darlington*,	1871
	Dr R. B. Finlay, Q.C., *Middle Temple, London*,	1864
	Dr F. W. Foxcroft, *Wilmslow*,	1893
	Dr Dyce Fraser, *Hawthornden*,	1883
280	Professor Gamgee, *Davos and Carlsbad*,	1863
	Dr William Gayton, *London*,	1886
	Dr W. C. Greig, *Morocco*,	1884
	Dr Groesbeck, *Cincinnati*,	1875
	Dr John Haddon, *Canonbie*,	1883
285	Dr Archibald Hall, *Montreal*,	1853
	Professor D. J. Hamilton, *Aberdeen University*,	1876
	Dr J. Home-Hay, *Alloa*,	1880
	Professor A. W. Hare,	1883
	Professor J. Berry Haycraft, *Cardiff*,	1889
290	Dr Stanley Haynes, *Malvern*,	1864
	Dr J. S. Howden, *Montrose*,	1856
	Professor A. W. Hughes, *Cardiff*,	1889
	Dr W. Hunter, *London*,	1887
	Dr Hugh Jamieson, 13 *Lauriston Place*,	1889
295	Dr James Johnston, *London*,	1871
	Dr George Keith, *Currie*,	1845
	Dr Skene Keith, *London*,	1885
	Dr W. Scott Lang, *Edinburgh*,	1886
	Dr Harvey Littlejohn, *Sheffield*,	1889
300	Dr Lowe, *Wimbledon*,	1845

		Date of Admission.
	Dr F. R. Macdonald, *Inveraray*,	1860
	Dr K. N. Macdonald, *Skye*,	1880
	Dr John A. Macdougall, *France*,	1875
	Professor J. M'Fadyean, *London*,	1888
305	Dr G. H. Mackay, *Elgin*,	1885
	Dr John Mackay, *Aberfeldy*,	1881
	Professor M'Kendrick, *Glasgow*,	1870
	Dr James Mackenzie, *Burnley*,	1894
	Dr W. O. M'Kenzie, D.I.G.H., *London*,	1845
310	Dr T. J. Maclagan, *London*,	1875
	Dr J. W. Martin, *London*,	1888
	Dr J. Moolman, *Cape of Good Hope*,	1877
	Dr A. E. Morison, *Hartlepool*,	1889
	Dr J. Ivor Murray, *Scarboro'*,	1857
315	Dr Andrew Myrtle, *Harrogate*,	1859
	Dr Leith Napier, *London*,	1879
	Dr Ernest F. Neve, *India*,	1884
	Dr T. Wyld Pairman, *New Zealand*,	1884
	Professor Bell Pettigrew, *St Andrews*,	1873
320	Dr Alexander Peyer, *Zürich*,	1893
	Dr J. A. Philip, *Boulogne-Sur-Mer*,	1878
	Professor W. S. Playfair, *London*,	1857
	Sir W. O. Priestley, *London*,	1854
	Dr J. H. Pringle, *Glasgow*,	1886
325	Dr S. Hale Puckle, *Bishop's Castle*,	1885
	Dr J. Maxwell Ross, *Dumfries*,	1882
	Dr J. R. Home Ross, *Burmah*,	1888
	Dr Joseph C. Ross, *Withington*,	1884
	Dr S. Rumboll, *Leeds*,	1887
330	Dr F. A. Saunders, *Grahamstown, South Africa*,	1884
	Dr C. A. E. Sheaf, *Queensland*,	1871
	Dr G. F. Shiels, *San Francisco*,	1887
	Dr W. H. Shirreff, *Melbourne*,	1883
	Dr T. Skinner, *London*,	1856
335	Dr W. Ramsay Smith, *Rhyl*,	1892
	Dr Towers Smith, *London*,	1892
	Dr Van Someren, *Redhill, Surrey*,	1845
	Dr Somerville, *Galashiels*,	1877
	Dr Graham Steell, *Manchester*,	1877
340	Professor Stephenson, *Aberdeen*,	1861
	Dr Robert Stirling, *Perth*,	1891
	Dr H. R. Storer, *Newport, Rhode Island, U.S.*,	1855
	Professor J. Symington, *Queen's College, Belfast*,	1878
	Professor Lawson Tait, LL.D., *Birmingham*,	1870
345	Dr Thin, *London*,	1861
	Dr T. Edgar Underhill, *Bromsgrove*,	1885
	Dr A. B. Urquhart, *Perth*,	1893
	Dr A. B. Whitton, *Aberchirder*,	1886
	Dr Oswald G. Wood, *India*,	1886
350	Dr G. Sims Woodhead, *London*,	1883
	Dr Strethill Wright, *Monmouth*,	1871
	Dr Yellowlees, *Gartnavel Asylum, Glasgow*,	1862
353	Professor John Young, *Glasgow*,	1860

N.B.—*Members are requested to communicate with the Secretaries if they discover any errors or omissions in the List, and also to intimate all changes in their addresses.*

CONTENTS.

I.—ORIGINAL COMMUNICATIONS.

(*a.*) General.

PAGE

1. Valedictory Address. By the retiring President, Joseph Bell, M.D., F.R.C.S. Ed., F.R.S.E., Consulting Surgeon, Royal Infirmary, - - - - - - - - 3
2. Massage as an Adjuvant to Medical, Surgical, and Gynæcological Practice. By J. Halliday Croom, M.D., F.R.C.P. & S. Ed., F.R.S.E., Lecturer on Midwifery and Diseases of Women, Edinburgh School of Medicine, and on Clinical Medicine, Royal Infirmary; Physician, Royal Infirmary, - - - - - 202
3. Practical Demonstration on the Therapeutic Methods employed in Static Electricity, with Exhibition of Apparatus. By Dawson Turner, M.D., F.R.C.P. Ed., Lecturer on Physics and Medical Electricity, Surgeons' Hall, Edinburgh, - - - - - 62

(*b.*) Physiological.

4. The Significance of the Venous Pulse. By James Mackenzie, M.D., Honorary Medical Officer to the Victoria Hospital, Burnley, - - - - - - - - - 69
5. The Action of Acids and Alkalies, and of some other Drugs, on the Secretions of the Body. By Alex. Lockhart Gillespie, M.D., F.R.C.P. Ed., Medical Registrar, Edinburgh Royal Infirmary, - - - - - - - - 234
6. Notes on the Physics of an Aneurism, with Practical Illustrations. By Dawson Turner, M.D., F.R.C.P. Ed., Lecturer on Physics and Medical Electricity, Surgeons' Hall, Edinburgh, - - - 267

(*c.*) Medical

(1.) *Diseases of the Glandular System.*

7. Clinical Remarks on a Case of Sporadic Cretinism. By Byrom Bramwell, M.D., F.R.C.P. Ed., F.R.S.E., Lecturer on Practice of Physic, Edinburgh School of Medicine, and on Clinical Medicine, Royal Infirmary; Assistant-Physician, Edinburgh Royal Infirmary, - - - - - - - - 34
8. Further Notes of a Case of Sporadic Cretinism, treated by Thyroid Feeding. By John Thomson, M.D., F.R.C.P. Ed., Lecturer on Diseases of Children, Edinburgh School of Medicine, - - 65

(2.) *Diseases of the Head and Neck.*

9. Notes of a Case of Recurrent Fibrinous Rhinitis. By Thomas M. Burn-Murdoch, M.B., C.M., Lecturer on Diseases of Children, Edinburgh School of Medicine, - - - - - 268

(3.) *Diseases of the Chest and Abdomen.*

10. A Case of Cancer of the Breasts, Spleen, and other Organs, which presented many features of Clinical and Pathological Interest.

PAGE

By Byrom Bramwell, M.D., F.R.C.P. Ed., F.R.S.E., Lecturer on Practice of Physic, Edinburgh School of Medicine, and on Clinical Medicine, Royal Infirmary; Assistant-Physician, Edinburgh Royal Infirmary, - - - - - - - 74

Report upon the Microscopical Condition of the different Organs, with Remarks upon the Pathology of the Case. By R. F. C. Leith, M.A., M.B., C.M., B.Sc., F.R.C.P. Ed., Pathologist to the Royal Infirmary; Lecturer on Pathology, Edinburgh School of Medicine, - - - - - - - - 84

(4.) *Diseases of the Skin.*

11. The Commoner Varieties of Lupus Vulgaris, and their Treatment. By Norman Walker, M.D., F.R.C.P. Ed., Assistant-Physician for Dermatology, Edinburgh Royal Infirmary, - - - 180

(5.) *Syphilitic Diseases.*

12. On Syphilitic Nodose Periarteritis. By Alexander Bruce, M.A., M.D., F.R.C.P. Ed., F.R.S.E., Assistant-Physician, Edinburgh Royal Infirmary; Lecturer on Pathology, Surgeons' Hall, - 190

(6.) *Therapeutics.*

13. Note on the Action of Iodine. By Dawson Turner, M.D., F.R.C.P. Ed., Lecturer on Physics and Medical Electricity, Surgeons' Hall, Edinburgh, - - - - - - 201

(*d.*) Surgical.

(1.) *General.*

14. Some Notes on Surgical Economy in Hospitals. By Arthur Neve, M.D., F.R.C.S. Ed., M.R.C.S. Eng., Surgeon, Srinagar Hospital, Kashmir, India, - - - - - - 263

(2.) *Diseases of Head.*

15. Intra-Cranial Surgery. By Thos. Annandale, M.D., F.R.C.S. Ed., F.R.S.E., Professor of Clinical Surgery, University of Edinburgh, 97

16. On a Self-inflicted Bullet Wound of the Head; Extensive Injury to Skull and Brain; Recovery. By A. Thomson Sloan, M.D., 45

(3.) *Diseases of the Abdomen.*

17. On Gastrostomy after the Method of Witzel. By Francis M. Caird, M.B., F.R.C.S. Ed., Lecturer on Surgery, Edinburgh School of Medicine; Assistant-Surgeon, Edinburgh Royal Infirmary, - - - - - - - - 26

(4.) *Diseases of the Extremities.*

18. Note on Bier's New Method of Treating Strumous Diseases of the Extremities by Passive Congestion. By Alexander G. Miller, M.D., F.R.C.S. Ed., Lecturer on Clinical Medicine, Edinburgh School of Medicine; Surgeon, Edinburgh Royal Infirmary, - 19

19. On Dr Heron Watson's Method of Excising the Wrist Joint. By Alexander G. Miller, M.D., F.R.C.S. Ed., Lecturer on Clinical Surgery, Edinburgh School of Medicine; Surgeon, Edinburgh Royal Infirmary, - - - - - - - - 228

20. On Displacements of the Semilunar Cartilages of the Knee Joint, with Lantern Demonstration. By Arthur Logan Turner, M.D., F.R.C.S. Ed., - - - - - - - 223

II.—LANTERN DEMONSTRATIONS.

PAGE

1. Demonstration of the Microscopic Pathological Changes found in the Brain and its Membranes in Insanity. By Dr Thomas S. Clouston, President, Dr Middlemass, and Dr F. W. Robertson, 176
2. Preparations from a Case of Syringomyelia, with Lantern Demonstration. By Dr Alexander Bruce, - - - - - 223
3. Microscopic Specimens from a Case of Syringomyelia. By Dr Byrom Bramwell, - - - - - - - 223
4. Displacements of the Semilunar Cartilages of the Knee Joint. By Dr Logan Turner, - - - - - - - 223

III.—EXHIBITION OF PATIENTS.

(1.) *Illustrating Diseases of the Nervous System.*

1. A Peculiar Case of Nervous Disease. Exhibited by Professor Sir T. Grainger Stewart, - - - - - - - - 2
2. A Case of Friedreich's Ataxia. Exhibited by Dr Alex. James, - 2
3 to 5. Three Women suffering from General Paralysis of the Insane. Exhibited by Dr F. A. Elkins, - - - - - - 12
6. A Case of Charcot's Disease in both Knees. Exhibited by Mr F. M. Caird, - - - - - - - - - 33
7 to 9. Three Cases of Pseudo-hypertrophic Paralysis. Exhibited by Dr Byrom Bramwell, - - - - - - - 232

(2.) *Illustrating Diseases of the Glandular System.*

10. A Case of Acromegaly in a Giantess. Exhibited by Dr Byrom Bramwell, - - - - - - - - 13

(3.) *Illustrating Diseases of the Skin.*

11. A Case of Psoriasis treated by Thyroid Feeding. Exhibited by Dr Byrom Bramwell, - - - - - - - 31
12. A Case of Lupus treated by Thyroid Feeding. Exhibited by Dr Byrom Bramwell, - - - - - - - - 31
13. A Case of Lupus in which the Thyroid Treatment had only commenced. Exhibited by Dr Byrom Bramwell, - - 33
14 and 15. Two Cases of Lupus under treatment with Thyroid Extract. Exhibited by Dr Byrom Bramwell, - - - - 63
16. A Case of Lupus under Thyroid Treatment. Exhibited by Dr Byrom Bramwell, - - - - - - - 175
17 and 18. Two Cases of Lupus under Thyroid Treatment. Exhibited by Dr Byrom Bramwell, - - - - - - 232
19. A Case of Lupus Erythematosus. Exhibited by Dr Allan Jamieson, - - - - - - - - 64
20. A Case of Lupus Vulgaris Erythematoides of Leloir. Exhibited by Dr Allan Jamieson, - - - - - - - 230
21. A Case of Early Rodent Ulcer. Exhibited by Dr Norman Walker, 33
22 and 23. Two Cases of Rodent Ulcer after Operation. Exhibited by Dr Norman Walker, - - - - - - - 221
24. A Case of Psoriasis under Thyroid Treatment. Exhibited by Dr Byrom Bramwell, - - - - - - - 63
25. A Remarkable Case of Ichthyosis. Exhibited by Dr Byrom Bramwell, - - - - - - - - 63

PAGE

26. A Case of Ichthyosis under Thyroid Treatment. Exhibited by Dr Byrom Bramwell, - - - - - - - 176
27. A Case of Lichen Pilaris, *var.* Spinulosus. Exhibited by Dr Allan Jamieson, - - - - - - - 230

(4.) *Illustrating Infectious Fevers.*

28 to 30. Three Patients after Recovery from Small-Pox. Exhibited by Dr A. T. Sloan, - - - - - - - 12

(5.) *Illustrating Affections of the Head and Neck.*

31. A Patient from whom a Tumour of the Brain had been removed. Exhibited by Professor Annandale, - - - - - 125
32. A Patient who had been operated on for Brain Abscess. Exhibited by Dr C. W. Cathcart, - - - - - - - 125
33. A Patient in whom the Mastoid had been Trephined. Exhibited by Dr C. W. Cathcart, - - - - - - - 125
34. A Patient in whom Staphi's Operation had been performed. Exhibited by Dr P. M'Bride, - - - - - - 125
35. A Patient in whom Drainage of the Mastoid Antrum was kept up by means of a Lead Cannula. Exhibited by Dr M'Kenzie Johnston, - - - - - - - - 126
36. A Girl who had been Trephined and the Lateral Ventricles Aspirated. Exhibited by Dr C. W. MacGillivray, - - 126
37. A Patient who had been operated on for Jacksonian Epilepsy. Exhibited by Dr Alexander Miles, - - - - - 126
38. A Patient Trephined for Middle Meningeal Hæmorrhage. Exhibited by Dr William Stewart, - - - - - 126
39. A Patient Trephined for Injury. Exhibited by Dr William Stewart, - - - - - - - - 126
40. A General Paralytic who had been Trephined. Exhibited by Dr John Macpherson, - - - - - - - 126
41. A Patient who had been Trephined for Subdural Cyst. Exhibited by Dr George A. Gibson, - - - - - - 126
42 and 43. Two Cases Trephined for Injury. Exhibited by Mr F. M. Caird, - - - - - - - - - 127
44. A Patient operated on for Epilepsy. Exhibited by Dr Alexander James, - - - - - - - - - 127
45. A Patient who had been Trephined for Basal Cerebral Hæmorrhage. Exhibited by Dr Andrew Smart, - - - - - 157
46. A Case of Recovery after Operation for Septic Sinus Phlebitis of the Lateral Sinus. Exhibited by Mr A. G. Miller, - - 230
47. A Patient after Excision of the Tongue. Exhibited by Dr J. M. Cotterill, - - - - - - - - 175
48. A Case of Fracture of the Superior Maxilla. Exhibited by Dr F. M. Graham, - - - - - - - - 180
49. A Patient on whom Excision of the Larynx had been performed. Exhibited by Dr J. M. Cotterill, - - - - - 175
50 and 51. Two Patients after Recovery from Tracheotomy for Diphtheria. Exhibited by Mr F. M. Caird, - - - - 180

(6.) *Illustrating Affections of the Chest.*

52. A little Girl treated by Aspiration for Pleuritis with Purulent Effusion. Exhibited by Dr James Carmichael, - - 220

(7.) *Illustrating Affections of the Abdomen.*

PAGE

53. A Patient on whom had been performed the double Operation of Œsophagotomy and Gastrotomy. Exhibited by Dr DAVID WALLACE, - - - - - - - - 2
54. A Patient on whom Gastrostomy had been performed, illustrating the Method of Witzel. Exhibited by Mr F. M. CAIRD, - - 13
55. A Patient operated on for Intussusception of Colon. Exhibited by Dr J. M. COTTERILL, - - - - - - - 175
56 and 57. Two successful Cases of Removal of the Vermiform Appendix for Acute Appendicitis. Exhibited by Dr C. W. CATHCART, - 231

(8.) *Illustrating Affections of the Extremities.*

58 to 60. Three Cases of Excision of the Wrist by Watson's Method. Exhibited by Mr A. G. MILLER, - - - - - - 221
61. A Patient after Operation for Genu Valgum. Exhibited by Dr J. M. COTTERILL, - - - - - - - - 1
62 and 63. Two Cases exemplifying Amputation of the Leg after the (Osteo-plastic) Method of Bier. Exhibited by Mr F. M. CAIRD, 2
64 and 65. Two Cases exemplifying Operation for Displacement of the Semilunar Cartilage. Exhibited by Dr LOGAN TURNER, - 221
66. A Case of Compound Subastragaloid Dislocation of the Foot. Exhibited by Dr WILLIAM STEWART, - - - - - 63

(9.) *Illustrating Deformities.*

67 to 69. Three Patients showing how strong the Heredity of Deformity may be. Exhibited by Dr J. C. DUNLOP, - - - 33
70. A Case of Unilateral Enlargement of the Bones of the Face and Anterior Cranium in a Male patient. Exhibited by Professor JOHN CHIENE, - - - - - - - - 231

IV.—EXHIBITION OF PATHOLOGICAL SPECIMENS.

(1.) *Illustrating Parasitical Diseases.*

1. Specimens of Anchylostoma Duodenale. Exhibited by Dr ALEX. BRUCE, - - - - - - - - - 15

(2.) *Illustrating Affections of the Head and Neck.*

2. The Temporal Bone from a Case of Septic Thrombosis. Exhibited by Dr JAMES CARMICHAEL, - - - - - - 18
3. The Calvarium from a Case of Suicide. Exhibited by Dr HERBERT LITTLEJOHN, - - - - - - - - 69
4. Preparations illustrative of Cerebral Surgery. Exhibited by Mr F. M. CAIRD, - - - - - - - - 161
5. A Preparation from a fatal Case of a Temporo-sphenoidal Abscess. Exhibited by Mr A. G. MILLER, - - - - - - 162
6 to 8. Three Specimens illustrating Cranial Surgery—two from Cases of Abscess, and one from Sinus Phlebitis. Exhibited by Dr J. W. B. HODSDON, - - - - - - - - 164
9. The Parts removed from a Case of Carcinoma of the Throat. Exhibited by Dr J. M. COTTERILL, - - - - - - 17
10. Specimens illustrating Tracheotomy and Diphtheria. Exhibited by Mr F. M. CAIRD, - - - - - - - 180
11. A Specimen of Hyperkeratosis of the Filiform Papillæ of the Tongue. Exhibited by Dr BURN-MURDOCH, - - - 221

(3.) *Illustrating Affections of the Chest.*

PAGE

12. A Ruptured Heart. Exhibited by Dr JAMES RITCHIE, - - 16
13. A Specimen of Advanced Fatty Infiltration of the Heart. Exhibited by Dr WILLIAM RUSSELL, - - - - - 17
14. An Aneurism of the Aorta with Rupture into the Right Ventricle. Exhibited by Dr EDWARD CARMICHAEL, - - - 221

(4.) *Illustrating Affections of the Abdomen.*

15. A Gall-Stone undergoing Disintegration. Exhibited by Dr WM. RUSSELL, - - - - - - - - - 17
16. A Cholesteatoma. Exhibited by Dr ALEXANDER BRUCE, - - 69
17. A large Polycystic Kidney. Exhibited by Dr JAMES RITCHIE, - 15

(5.) *Illustrating Affections of the Extremities.*

18. A Thumb which had been Amputated at the Metacarpo-phalangeal Joint for a Compound Comminuted Fracture. Exhibited by Dr ROBERT MACKENZIE, - - - - - - - 15
19. A Joint which had been Excised. Exhibited by Dr F. M. GRAHAM, 180

V.—EXHIBITION OF MISCELLANEOUS OBJECTS.

(1.) *Mechanical and Surgical Instruments.*

1. Apparatus for Static Electricity. Exhibited by Dr DAWSON TURNER, - - - - - - - - - 62
2. Instruments devised for the purpose of throwing down a large flap of Bone from the Cranium, retaining its connexion with Skin and Pericranium. Exhibited by Dr J. M. COTTERILL, - - 162

(2.) *Therapeutic Agents.*

3. A Soap of Resorcin and Salicylic Acid. Exhibited by Dr ALLAN JAMIESON, - - - - - - - - - 223

(3.) *Casts, Photographs, Drawings, Microscopic Sections, etc.*

4. A Cast of the Skull of King Robert the Bruce. Exhibited by Dr BURN-MURDOCH, - - - - - - - - 232
5. Photographs of Cases of Lupus treated with Tuberculin. Exhibited by Dr WILLIAM RUSSELL, - - - - - - 34
6. Photographs of a Case of a Cretin under Thyroid Treatment. Exhibited by Dr JOHN THOMSON, - - - - - - 65
7. Drawings of a Case of Ichthyosis. Exhibited by Dr BYROM BRAMWELL, - - - - - - - - - 63
8. A Photograph of the Head from a Case of Suicidal Pistol Wound. Exhibited by Dr HERBERT LITTLEJOHN, - - - - 68
9. Microscopic Specimens of the Anchylostoma Duodenale. Exhibited by Dr ALEXANDER BRUCE, - - - - - - 15

(4.) *Miscellaneous.*

10. A Revolver which had been used in a Case of Suicide. Exhibited by Dr HERBERT LITTLEJOHN, - - - - - - 68
11. A Hatchet which had been used in a Case of Suicide. Exhibited by Dr HERBERT LITTLEJOHN, - - - - - - 69
12. Two Cartridges removed from the Head of a Boy. Exhibited by Dr JOSEPH BELL for Dr BENJAMIN BELL, Kirkwall, - - 232

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TRANSACTIONS

OF

THE MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH,

FOR SESSION LXXIII., 1893-94.

Meeting I.—November 1, 1893.

Mr Joseph Bell, *President, in the Chair.*

I. Election of Office-Bearers.

The following gentlemen were elected Office-bearers for the ensuing year:—*President*, Dr T. S. Clouston; *Vice-Presidents*, Dr Claud Muirhead, Dr R. J. Blair Cunynghame, Dr John Wyllie; *Councillors*, Mr Caird, Dr Thom, Dr Lundie, Dr James, Dr Melville Dunlop, Dr R. W. Philip, Dr Joseph Bell, Dr Russell Wood; *Treasurer*, Dr Mackenzie Johnston, 44 Charlotte Square; *Secretaries*, Dr William Russell, 46 Albany Street, and Mr Hodsdon, 52 Melville Street; *Editor of Transactions*, Dr William Craig, 71 Bruntsfield Place.

II. Election of Member.

Robert Mackenzie, M.D., 1 Bruntsfield Terrace, was elected an Ordinary Member of the Society.

III. Exhibition of Patients.

1. *Mr Cotterill* showed a patient who had been operated on for genu valgum. J. G., 35 years of age, suffered from rickets since infancy. Began to suffer from pain last year, due to prolonged standing at his work of bookbinding. Has always had plenty of food and comfortable surroundings, and there is no other such case among his relations. The condition was very aggravated, both

patellæ being dislocated from the intercondyloid notch and lying outside the external condyle. The patient walked with the femora flexed through an angle of about 70° on the pelvis, and the knees crossed each other in walking. The internal condyles were very much enlarged. When the knees were put side by side with the patient lying on his back, the great toes were separated by a distance of 32 inches; and the knee-joint was only about 8 inches from a line drawn between the big toes. Double osteotomy (Macewen) was done on January 19, 1893. The bones were found extremely hard and difficult to break. There was considerable trouble with pressure sores during the after-treatment, but the patient has now entirely recovered, and can walk six or eight miles without fatigue. His appearance is now normal, and his height has been raised by the operation by about a foot and a half.

2. *Mr Caird* showed two cases exemplifying AMPUTATION OF THE LEG after the (osteo-plastic) method of Bier.

3. *Mr David Wallace* showed a female patient, 27 years of age, upon whom he had performed the double operation of ŒSOPHAGOTOMY and GASTROTOMY for the removal of a PLATE WITH FIVE TEETH. (The plate was also shown.) The patient was admitted to Ward 14 of the Royal Infirmary on 31st July 1893, and stated that seventeen hours previously the teeth had passed into the gullet. The plate was caught with a *coin catcher*, but could not be dislodged. An endeavour was made to remove it through an opening in the œsophagus made as low down in the neck as possible, but although it could be caught with dressing forceps it remained immovably fixed a little way above the cardiac opening. This endeavour having failed, Mr Wallace at once performed gastrotomy—passed his hand into the stomach, and having introduced his finger into the œsophagus, grasped the plate with a pair of dressing forceps and readily withdrew it. The stomach wound, 4 inches long, was then stitched (Czerny-Lembert), and the abdomen closed. The whole procedure occupied two hours. The patient made an excellent recovery, and left hospital six weeks after admission. She states (November 1st, 1893) that she is in perfect health. The wounds are firmly and completely cicatrized.

4. *Professor Grainger Stewart* showed a peculiar CASE OF NERVOUS DISEASE.

5. *Dr Alexander James* showed a case of FRIEDREICH'S ATAXIA.

6. *Dr Shand* related a case where rapid healing had taken place under ice.

IV. Original Communication.

VALEDICTORY ADDRESS.

By Joseph Bell, M.D., F.R.C.S. Ed., *President.*

Gentlemen,—I have now to occupy the Chair for the last time as your President. Two years ago, when by your kindness you placed me in it, I ventured to promise that if I could not be a brilliant Chairman, at least I would try to be a diligent one, and regular in my attendance. I have not missed one minute of the meetings of the Society during these two years, except when in May 1892, by the orders of my College, I had to be in London on a deputation business on the very day the Society met.

I would now with much gratitude simply leave the Chair and ask my successor to take it and do his duty better than I have done; but it is an old custom of this Society that the retiring President should make a short valedictory address regarding his period of office.

New Members.—The Society keeps up its members well. During my term of office forty-eight new members have been elected. We have lost two by resignation, and it is now my duty—a sad one—to read the names of those members who have been removed from our roll by the hand of death. Fortunately, during my term of office the list has not been a long one, but it contains the names of some men greatly beloved, who justify a word of remembrance and regret.

Francis Brodie Imlach will not soon be forgotten by those of us who knew and loved him, from his many high qualities of head and heart. Successful in his own branch of the profession, he was able to retire from its exacting duties many years before his death; and these years were not idle, but devoted in many ways to the best interests of science and of medicine. He was a modest, retiring man, and did not often read papers or share in debates in the Society. Of a noble presence, and with most courteous manners, his striking personality and kind heart will keep his memory green. Had he survived till now, he would have attained his jubilee as a member.

James Donaldson Gillespie, who, like his old friend Imlach, was one of the sunniest-natured and most tender-hearted of men, for many years identified himself with the fortunes of the Society, and was one of its most zealous and successful office-bearers. Successively Councillor, Secretary, and President 1875–6, few men of this generation have done more for the Society than he did, and his communications and papers on many subjects were most valuable and suggestive.

I need only allude to his papers on Hydrocele, January 1862, and

Excision of the Wrist, December 1870, as distinctly important contributions to practical surgery. His work in the Lock Hospital bore fruit in an admirable article on Condyloma. Two cases, reported at different times, in which death had taken place during the administration of chloroform, testified to the zeal for truth and unselfish disregard of his own credit. If every case of chloroform disaster was reported with equal care and accuracy, the profession would soon have data of real value to help in the estimation of the percentage risk in chloroform administration and the details which make for danger. His special experience in a great hospital was utilized on two separate occasions for our instruction,—once when, in June 1862, he gave an account of an Epidemic of Scarlet Fever in Donaldson's Hospital, and again in May 1870, when he described an outbreak of Typhoid in the same Institution. His valedictory address in leaving this Chair in 1878 was a thoughtful, able, and kindly discourse. One remark he made, which seems of considerable importance on the subject of the practice of permitting no discussion to take place on cases or specimens exhibited:—"It appears to me that, as our transactions are regularly published in the *Medical Journal*, the tacit approval of the Society would seem to be accorded to opinions uttered by the exhibitors, which I for one would occasionally like to call in question. While revising the records of the last two years, I found various statements about cases which would have been much benefited by passing through the ordeal of discussion, and I see no reason why the members of this Society should not be permitted to make remarks on subjects, often of more practical interest than the regular written papers, provided the President keeps the discussion within due limits."

Dr James Young has died since our last meeting, and we will all miss from our Society the bright eagerness of attention with which he welcomed anything in a paper or speech that struck him as new or interesting. A gentle, warm-hearted, amiable man, he was beloved by his patients, and by the friends who knew him best. He did not push himself forward at all in the Society. I can discover only one paper of any length from his pen, "On the Wire Seton in Hydrocele," 1862. Oddly enough this apparently mild and harmless proposal, which has been frequently reinvented since, excited the wrath of some of the surgeons, and drew out a discussion of considerable briskness, Dr Gillespie taking one view and Dr Young another. *Tantæne cœlestibus iræ!*

To our sister Society, the Obstetrical, Dr Young was a most diligent and valued contributor. It is pleasant to think that family, of which Dr James Young was the second generation in medicine, is still to be kept up in Edinburgh by his son Dr Richard Young, one of our members.

Dr Stewart of Kirkwall was one of our members; but eminent as he was in his own district, I cannot discover that he ever took

part in our meetings except as an auditor. He held many of the most important public appointments in the capital of the Orkneys.

A Word on our Meetings.

Looking back on the work of the past two years, the Society has a right to be proud, as there has been no lack of material. Papers, patients, and specimens have been numerous and varied. Many of the members have contributed, and to some we are specially indebted for many valuable communications. Let me first recall to your memories some of those extra meetings convened for a special purpose.

On January 6th, 1892, Mr Harold Stiles kept up the interest of the Society during a long and beautifully clear paper on the Pathological Anatomy of Cancer of the Breast, with special reference to its Operative Treatment. In emphasizing the absolute importance of complete removal of the organ, he showed us how the extent of area of the edges of the breast was generally under-estimated. He pointed out that a knife uncleaned during the operation might unconsciously leave behind it a cancer germ in the cicatrix, and he proved to us how often recurrence takes place in neglected axillary glands and in unremoved pectoral fascia, —a brilliant demonstration of work, which the universal consent of surgeons has accepted as an epoch-making contribution to Surgery.

On June 22nd, 1892, another most important subject was introduced for discussion in an exhaustive paper by Dr Brakenridge on the Treatment of Pernicious Anæmia by the Transfusion of Human Blood. The discussion was a most brilliant and valuable one, and you will not have forgotten Dr Affleck's interesting case, the convincing clearness of Dr John Duncan's account of his operations of transfusion, their difficulties, dangers, and successes; and then the varied and valuable discussion which followed.

Another most interesting special meeting was held on February 15th and 16th, to discuss the subject of Myxœdema and its Treatment, and you will remember with what an array of talent it was methodically brought under the notice of the Society. Our indefatigable Secretaries had well marshalled their men. Dr Byrom Bramwell led off by a most lucid picture of its clinical features. Professor Greenfield's disquisition on its pathology and morbid anatomy was exhaustive, and was illustrated by a large number of microscopic and naked-eye specimens, which were on view in the sideroom, and in addition this communication was illustrated by limelight views of the tissues affected. While the symptoms and pathology were still freshly impressed on our minds, Dr Lundie read an account of a most characteristic case, described it with a brightness and felicity of style which held the

Society entranced, and without being tedious gave a *résumé* of the literature of the subject and the different methods of treatment. By this time the evening was far spent, so on the motion of Dr Affleck the discussion was adjourned till next day at 4.30—at which time, to a large and enthusiastic meeting, he began a discussion on the whole subject of Myxœdema, and also alluded to the treatment of Sporadic Cretinism on the same lines and showed an excellent case. Dr John Thomson followed this up by showing two most characteristic cases of Sporadic Cretinism, in one of which the results of treatment were perfectly astounding in their rapidity and success. Dr Byrom Bramwell then exhibited two typical cases of Myxœdema—one in an elderly woman and in a younger one—in which the change and improvement were most remarkable under thyroid feeding. He also showed a remarkable case of Psoriasis treated in the same manner, with marked success. Dr Russell and Dr John Thomson showed cases of Myxœdema as yet untreated, and Dr Bruce another undergoing treatment, but in which the cure was as yet incomplete. After Dr Russell had exhibited some sheep's thyroids, Dr Melville Dunlop related briefly, but most clearly, the history and progress of some six cases he had under his own care; and Dr Church also gave us the benefit of his experiences of the disease. The Society was then honoured and gratified by an interesting speech by Dr George Murray of Newcastle, the originator of the treatment by thyroid feeding, who, with great clearness and frankness, told us both of his successes and his failures. After Drs Davis, Stalker, and Foulis had added their own experiences, Dr Thomson related the post-mortem appearances seen in a case which died during treatment,—thus rounding off a most important two days' discussion, which marks an epoch in medical practice, and might stand as a model of the highest function of a great scientific society. One regretted the absence of Dr Clouston from the actual discussion, but his important note on the Mental Symptoms in Myxœdema enriches the very full report of the two days' work in the *Transactions* of the Society.

There were other outstanding meetings in which the Secretaries endeavoured, with marked success, to choose a special subject, or group of subjects, for discussion.

On the first of these occasions Dr Lockhart Gillespie introduced the subject of gastric disorders, by a most able and instructive paper entitled, "Some Practical Results from the Chemical Examination of the Contents of the Healthy Stomach," illustrated by lime-light views. The paper was almost too good for its object, and did not invite or provoke much discussion.

The meeting in March 1893 was specially arranged for subjects bearing on the surgery of the abdomen. Dr John Duncan read us a paper on the Surgical Treatment of Gall-stones, which evinced much practical knowledge of the subject, set forth in his usual lucid and cultured style. Dr Rutherford Morison of Newcastle

followed this up by a paper on Some Mistakes in the Technique of Abdominal Surgery. His boldness in operating, his dexterity in the adoption of simple means to valuable results, impressed the Society that if mistakes and accidents did happen, he at least would do his best to prevent them from occurring in his practice.

The May meeting was again arranged for the discussion of a special subject from two points of view. It was on diseases of the Appendix Vermiformis, with cases, and here again Dr Duncan and Dr Affleck were conjoined in a most valuable presentment of these obscure and dangerous affections, from the standpoint of the physician as well as the surgeon. Both branches of the profession were at one as regards both the pathology and treatment of this dread malady, and the Society were instructed both as to the necessity in many cases of relapsing appendicitis for an operation, and also as to the proper time to choose and the best method of performing it.

Where all the papers read have attained a high standard of excellence, it seems almost invidious to select some for special mention; but among others the following seem to stand out, either from their exhaustive character or originality.

Dr Sloan's case of Hystero-Catalepsy, remarkable in itself, was described with a realistic power and dramatic force which impressed its clinical features on the Society. Dr James exhibited all his well-known originality and scientific precision in his paper on Emphysema and Bronchiectasis; even if it did not convince every one that his theory was correct, no one could fail to be stimulated both to observe and to reason. Dr Philip showed great industry in his collection and collation of 1000 cases of Pulmonary Tuberculosis. Dr Alexander Miles deeply impressed the Society by his thoughtful, original, and well-reasoned theory of Cerebral Concussion. Dr Macpherson and Mr Wallace, in their joint paper on the Surgical Treatment of General Paralysis of the Insane, encouraged the Society to hope that something may yet be done to cure that hopeless malady. Dr Templeman of Dundee, in his able paper on 250 cases of Suffocation of Infants, touched on a subject interesting not only to the medical man, but to the magistrate and the social reformer.

Dr William Russell, in his Practical Results of the Investigation of Cholera in Germany, made a valuable contribution to that great and important question, How to prevent and how to combat a cholera epidemic. Mr Wallace told the Society what the cystoscope could do in the elucidation of the diagnosis of cases of Tumour of the Bladder. Dr Norman Walker read a paper on, and made a clear demonstration of, the microscopic condition which, in his opinion, constituted Rodent Ulcer; and Dr Robert Fleming's account of a case of Noma was enriched by a copious bibliography, and some interesting observations on the bacteriology of this

obscure disease. Mr Caird recorded, in his own brief, incisive style, important contributions to Operative Surgery.

Time would fail me were I to recount even a few of the interesting patients that were shown to the Society. Drs John Thomson, Allan Jamieson, Mr Caird, Mr Alexis Thomson, Dr Cotterill, Mr Cathcart, and Mr Wallace were specially active; and other members showed Pathological Specimens and New Instruments of great value.

A Retrospect and an Outlook.

A century since the days of Nestor is reckoned to include three generations of men, and it is thirty-one years ago since from this Chair my father delivered his valedictory remarks after he had finished his term as President of this Society. Perhaps you will excuse me if from its record I gather one or two points which may interest us historically, and possibly aid us in making progress. To the seniors among us a melancholy pleasure is found in dwelling on the honoured and beloved names of those who in their day had read papers to the Society. The amiable and courteous Patrick Newbigging had narrated the case of his revered friend and teacher, Dr William Pulteney Alison. Alexander Wood and Skae, both the Begbies, Matthews Duncan, Syme, Spence, Handyside, and Gillespie had delighted and instructed the Society. All these, and many more less-known names, have now joined the majority. But many who still remain to us as seniors are in that biennial retrospect recorded as having done good work. W. T. Gairdner was discussing the use of alcoholic stimulants in hospital practice. Dr T. G. Stewart read a most creditable paper on the Waxy or Amyloid form of Bright's Disease, the first step in the work, both pathological and clinical, which has proved a ladder to the highest position in the teaching of clinical medicine in Scotland. Dr P. H. Maclaren recorded a case of Abscess in the Cellular Tissue surrounding the cæcum, which ended in recovery, and Dr Maclaren's reflections on the case were highly creditable to his judgment and sound professional knowledge. Here, again, we have probably the earliest publication of one who now occupies such a high position in Edinburgh Surgery, and still looks as if he was good for a few more generations of work. Heron Watson showed, in a case interesting both pathologically and clinically, the firm grip he already possessed of the art of treatment, even in hopeless cases; for he utilized Dr Wood's new method of the hypodermic injection of morphia to relieve suffering in a case of bladder cancer. Syme's communication was on a subject still interesting, and still in process of improvement,—the radical cure of Inguinal Hernia by a modification of Wütz er's method by invagination of skin. I fear in the present day both Wütz er's method and Syme's modification are deservedly forgotten.

Looking back on this old address, we seem to miss familiar

words and dominant theories,—drainage of wounds is never mentioned, sepsis and asepsis, antiseptics and germicides, are alike unknown. Microbes and bacteria had not yet sailed or swam into the field of the microscope or the depths of the wound. Acupressure, however, had just been devised by the keen logical intellect of James Simpson, and Handyside's paper described one of the earliest, if not the very earliest, case in which it had been tried. Done under adverse circumstances, and for spreading gangrene, it was quite a success, and gave rise to a lengthened and full discussion of the new method of checking hæmorrhage.

This easy-tempered and calm generation can hardly realize with what heat of debate, flavoured by a tinge of personal animosity, such apparently colourless and neutral subjects as methods of checking hæmorrhage or the treatment of hydrocele by wire setons were discussed in the Society. The retiring President, in his own calm way, alludes to this in the end of his address, and describes the speakers taking their sides and giving forth their sentiments with more energy and warmth than might be expected in the calm atmosphere of scientific inquiry and professional responsibility. He even explains the absence from the meetings of many of the seniors of the profession by the distaste they must feel when, with a name and reputation already achieved, they find themselves brought into a position of hot, perhaps uncourteous, gladiatorship with much younger men, who have not yet the same dignity to imperil.

Our discussions certainly nowadays cannot be said to be too energetic, and certainly not discourteous: the great difficulty generally is to get up a discussion at all. The paper is either received with enthusiasm, or at worst damned by faint praise, or welcomed with an icy silence; and the remarks, when they do come, are more generally words of additional experience than searching criticism.

I sometimes feel that the pendulum has swung too far in the other direction, and that a good rattling criticism of a pretentious or tedious paper would be preferable to the polite indifference which is the worst that now is likely to befall it. A better explanation may be found possibly in the more optimistic view that now all the papers read before the Society really require praise and confirmation, because of their absolute perfection.

But the other point raised in the valedictory of 1862 is still a burning question. Many of the older and respected members of the Society had then virtually withdrawn from its meetings. Is it not so now? With some slight exceptions, which will come unbidden into all your minds, the names of many of the leaders of the profession in Edinburgh are never seen on our billets, and their forms are absent from our benches. Why is this? They

certainly have not been alarmed by too energetic debate, or offended by the criticism of brilliant youth. Are they too busy? No; most of them are consultants, and, as a rule, we do not have consultations in the dark. Are they too old or too weak in health? No; for they still can go out to dinner, to a concert, or even, on rare occasions, to witness a good play. Why is it that they do not join in our discussions, and learn from our papers? Their interest in the profession and its rewards is as keen as ever. Can we not find an explanation where we should always first seek one, in the primitive and simple desire for food and rest? Even the untutored savage does not like to leave his wigwam immediately after the great feast of the day, far less the wise physician. Thirty years ago five was the usual dinner hour, and on great occasions perhaps it might be as late as six. Now we are fortunate if we get a chance of our dinners by 7.30, and what chance has the Society against such a rival? To get to the Society at eight, one simply has to insist on a scratch dinner at seven, hurry over coffee, and start. How would it do to try an occasional meeting at five? That hour would allow two or two and a half hours before dinner, and might encourage a fuller attendance. The older members present will pardon an allusion to the history of another Society cognate to ours. The Medico-Chirurgical Club was a delightful adjunct to this Society. One Thursday in every month the members met at 9 P.M. to talk of the meeting of the preceding Wednesday over a frugal meal of spatchcock, finnan haddocks, and whisky toddy. Late dinners killed, or at least altered all that. Let us try to prevent late dinners killing our Society, and let us at least try the experiment of an occasional meeting at five instead of eight.

We have also had our trials and difficulties as to our place of meeting. The room in 117 George Street (to which we have now returned) was for many years an excellent central position. By some unlucky accident we lost it, and then migrated to the hall sacred to the University Education of Women, 15 Shandwick Place. This had its defects: it was up a very dark steep stair, and its acoustics were not good; but its distance suited the West-end members, and the tramcars passed the door. When the University opened its doors to women, the *raison d'être* of the Association ceased, and so the hall was parted with, and our Society was homeless. After two charming meetings in the hall of the Royal College of Physicians, most hospitably lent to us by the Council, we at last found refuge in the rooms of the Lyric Club in George Street. Dark, noisy, ill-arranged for ventilation, these rooms were redeemed only by the presence of some very comfortable armchairs, the race for the possession of which always ensured that some members of the Society were not only present, but early on the scene.

Our wanderings, homelessness, and general discomfort stimu-

lated our energetic secretary, Dr Wm. Russell, to exertion. A Hall Committee was appointed, and many efforts were made and much trouble taken by him to light upon some suitable place, which we might either buy or rent on a lease as a sort of permanent home for the Society. A financial scheme was started, by which members were, by taking shares in a sort of limited company, to subscribe, according to their means and liberality, to the purchase of a hall. As yet nothing has been achieved; site after site has been discussed; buildings have been examined and treated for without success, and now we are starting a new session still in a hired house, to some of us with so many old associations as almost to entitle us to call it our own hired house. Doubtless, much good work will be accomplished in this humble room; but still there rises before my imagination a happy time when, by the joint liberality of the senior members of the Society and of the two great Edinburgh Corporations, a stately hall may be obtained, well lighted, comfortably seated, furnished with tables for microscopes and specimens, and suitable retiring rooms for patients, in which all the learned and scientific societies related to Medicine in Edinburgh may find a home,—a sort of Academy of Medicine, where suitable rooms may contain the libraries and museums of each Society, where a pathological and also a physiological laboratory may be at the service of the younger men, where a cup of tea or coffee can be got when required, and where (perhaps this is Utopian) a room or two may be found for those members who make personal experiments on nicotine, or study the physics of an ivory sphere impelled by the impact of a leather-tipped cue. Those of you who have studied the early history of the Medical Society of Aberdeen know how much it, and, indeed, the Medical School of Aberdeen, owed to a wise bequest which started a very small society in a very handsome house. We do not ask for much: two really good houses in Charlotte Square, and a few hundred pounds for alterations, would be sufficient for our humble needs. Who will supply the want?

But a luxurious house and fine rooms are not the chief desiderata in a Society like ours. What we need for it to maintain its great reputation of the past, and extend it in the future, is zeal on the part of its members. Let the seniors come out and give their experience; let the younger ones try not to despise the ignorance of their elders; let each and all try to edify and instruct, and add to the store of knowledge and experience, experiment and practice, on which alone is real professional progress based. Brevity and precision in statement, careful excision of all superfluous detail and repetition, a determined extermination of every historical allusion to Hippocrates or Galen, Ambroise Paré or Scultetus, will give us time to discuss the papers, which, under these conditions, cannot possibly be longer than twenty minutes. I fear I have exceeded that wise limit, and will now end by thanking you most

heartily again for the honour you did me two years ago by electing me to the honourable office of your Chairman, and for all the patience and forbearance you have shown me in my most unworthy fulfilment of my duties.

Dr John Smith proposed a vote of thanks to the President for his services.

Meeting II.—December 6, 1893.

Dr Clouston, *President, in the Chair.*

I. Election of Members.

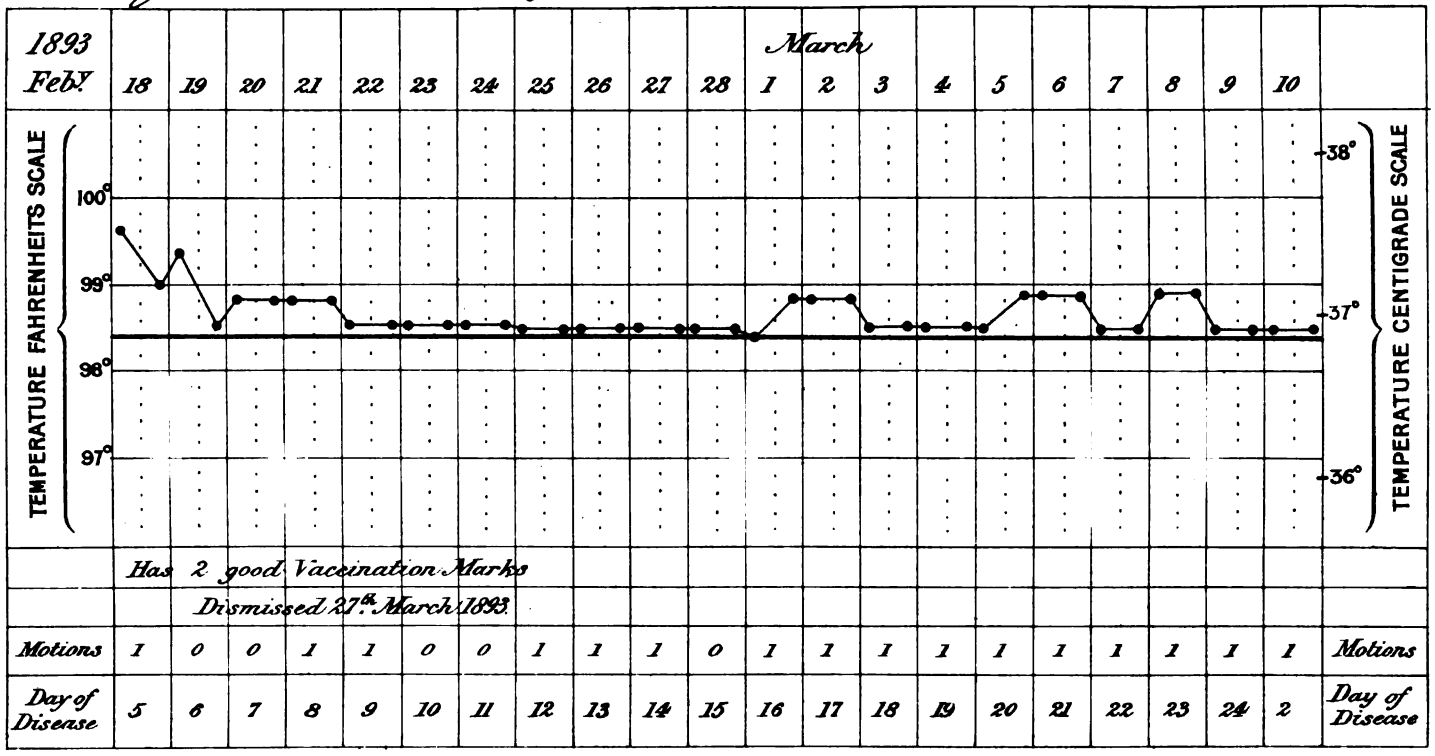
W. Ford Robertson, M.B., C.M., Royal Asylum, Morningside, and James Mowat, M.B., C.M., Priestfield Road, were elected Ordinary Members of the Society.

II. Exhibition of Patients.

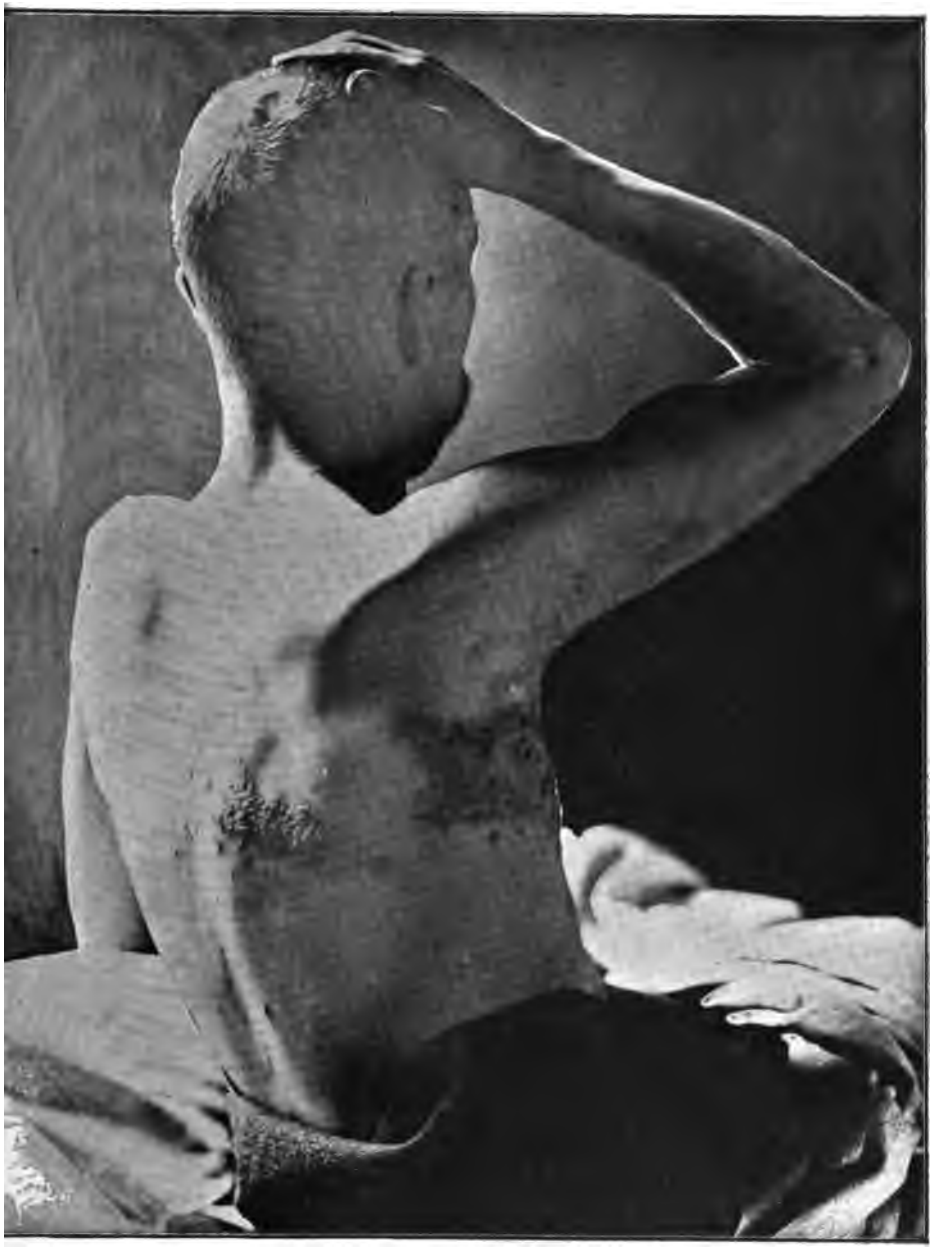
1. *Dr Elkins* showed three women suffering from GENERAL PARALYSIS OF THE INSANE, to emphasize the difference between male and female general paralytics, and pointed out that the disease is rarer in women than in men in the proportion, according to Mickle, of 1 to 4 or 5; the average course is milder and longer; the remissions less frequent and less marked; the spinal symptoms, if present, less decided; and the so-called "congestive attacks" less frequent and less severe. The cases showed the usual motor symptoms of the disease, but from the mental aspect they varied much from the classical general paralytic. They were non-delusional, silly, childish, easily pleased, had considerable loss of memory, and were generally enfeebled in mind. There had been an increase in female general paralytics admitted to Morningside Asylum in recent years. Formerly one, two, and three cases were the more common numbers yearly admitted, but in 1891 there were eight cases, in 1892 six cases, and up to the present date during 1893 eleven cases had been admitted. Dr Elkins believed it would be fairer to say that the area of certifiable lunacy had increased rather than that general paralysis was more common now in women than formerly. Many of the cases would formerly have been treated outside an asylum, and most of the cases were far advanced in the disease when they were admitted from their homes or from the poorhouse.

2. *Dr A. T. Sloan* showed three patients after recovery from SMALL-POX. The first was a little girl of 3 years. The early age at once suggested the possibility of chicken-pox, but the character,

Name J—— L—— Age 23 Disease Puerperium and Small Pox Result Recovered


1893
Feby. 18 19 20 21 22 23 24 25 26 27 28
March 1 2 3 4 5 6 7 8 9 10
TEMPERATURE FAHRENHEITS SCALE
100°
99°
98°
97°
38°
37°
36°
TEMPERATURE CENTIGRADE SCALE
Has 2 good Vaccination Marks
Dismissed 27th March 1893.
Motions 1 0 0 1 1 0 0 1 1 1 0 1 1 1 1 1 1 1 1 1 1 Motions
Day of Disease 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 2 Day of Disease

Dr A. T. Sloan's Case of Herpes Zoster combined with Smallpox.



Dr A. T. Sloan's Case of Herpes Zoster combined with Smallpox.

and especially the distribution of the rash, were conclusive. When seen, the face and head were completely covered with a hard papular rash, in some places vesicular and sero-purulent, and on the forehead distinctly confluent. The rash was pretty well distributed over the arms, especially on the flexor surfaces. There were no vaccination marks visible, though the child had been vaccinated. The patient showed very well the after-appearance of a mild attack of small-pox. A few pits were present, while both cheeks, especially the right, were covered with little pink spots, which shone and glistened on exposure to cold. Premature labour came on in the second patient when seven months pregnant. The temperature was elevated (102°·4 F.), and she showed the distinctive papular rash of small-pox on the face, head, arms, and abdomen. She gave birth to a female child, which exhibited no rash, and died in a few hours. The mother made an uninterrupted recovery in hospital, the temperature never after the fourth day being above normal, and on the fourteenth day only rising to 98°·8 F. Slight pitting was present after the attack. Two good vaccination marks were visible. The third patient's illness had commenced with a very severe attack of herpes zoster. The tongue was coated; he felt inclined to shiver, and looked very ill; and suffered intense pain, not only pain in the side being present, but also in the back and head. Under treatment he had become easier the next day, but a further eruption had made its appearance on the chest and abdomen, here and there petechiæ, with a general mottling of a measly character. The next day the typical shotty eruption of small-pox was present on the forehead, face, and scalp, with a few papules on the arms and trunk. He was removed to hospital, where the photographs were taken on the second day of the small-pox and fourth of the herpetic eruption. On the abdomen and chest are seen the preliminary rashes of a measly character, while the true papules of small-pox are indicated on the cheeks, especially the right; and over the left malar bone, where they are confluent, and on the right arm and back. The herpes forms a complete half-girdle round the chest, reaching from sternum to spine. Such a complication of small-pox had never, as far as could be discovered, been described before. The herpes did not seem to be a mere accident, as the patient had been infected with small-pox at least twelve days before, and the simultaneous appearance of the herpes with the preliminary rashes seemed to show a complication never previously observed.

3. *Mr Caird* showed a patient on whom GASTROSTOMY had been performed, illustrating the method of Witzel.

4. *Dr Byrom Bramwell* showed a case of ACROMEGALY in a giantess. The patient, aged 28, measured 6 ft. 2½ in. in height, and weighed 24½ stones. Up to the age of 16 she was in no way

peculiar for her size. She then began to grow rapidly, and by the age of 20 had attained her present height. In many of its features the case resembled acromegaly, but some of the typical characteristics of that disease were wanting. The overgrowth, though certainly more marked in the hands and feet than elsewhere, was more general than the overgrowth of typical acromegaly; the shape of the fingers and lower jaw was not characteristic; menstruation was not arrested; the mammæ were not atrophied; the appetite was small; the urine was scanty; and the pulse was of normal frequency. The patient complained of debility, lassitude, excessive sweating, thirst, headache, and neuralgic pains. There was an excessive growth of hair on various parts of the body; numerous small-stalked warts had developed on the surface of the skin since the illness commenced; the spinal column was curved in the upper dorsal and cervical regions; the soles and palms were thickly padded with fat; the temperature was subnormal; and at the time of the patient's admission to hospital the temporal portion of the field of vision was markedly constricted in the right eye. Notwithstanding the absence of some of the characteristic features of acromegaly, notably the arrest of menstruation, atrophy of the mammæ, and the characteristic shape of the hands, fingers, and lower jaw, Dr Bramwell was disposed to think that the case resembled acromegaly rather than any other known disease. (He referred to a case which had recently been examined post-mortem in America, in which acromegaly occurred in a giantess.) The patient had been treated first with extract of thyroid, which seemed to aggravate the symptoms, and then with extract of the pituitary gland, which seemed to do good. The patient had distinctly improved during her stay in hospital; the headache from which she had suffered every day for six years had entirely disappeared, the sweating was very much less marked, she felt very much stronger, and the constriction of the field of vision had disappeared. Possibly the improvement was due to the pituitary extract, but Dr Bramwell did not wish to lay too much stress upon this point. It was difficult to draw conclusions from a single case; and in a previous and more typical case of acromegaly which he had treated last year the pituitary extract seemed to do harm, whereas the thyroid extract seemed to do good. Possibly the improvement was the result of the altered conditions in which the patient was placed during her stay in hospital. But, be this as it may, the pituitary treatment of acromegaly deserved a thorough trial; for one of the most constant pathological features of the disease was the enlargement of the pituitary gland, and it had been theorized that the symptoms of acromegaly were due to disease of the pituitary gland, just as the symptoms of myxœdema were due to disease of the thyroid gland.[1]

[1] This question is considered in detail in Dr Byrom Bramwell's *Atlas of Clinical Medicine*, vol. ii., part 3.

III. Exhibition of Specimens.

1. *Dr Robert Mackenzie* showed a THUMB which had been amputated at the metacarpo-phalangeal joint for a compound comminuted fracture.

2. *Dr Alexander Bruce* showed naked-eye and microscopic specimens of the ANCHYLOSTOMA DUODENALE, some of which were obtained in Aix-la-Chapelle, and others, through the kindness of Dr Tyrie, from Cairo. Attention was drawn to the fact that the parasite was now recognised as the cause of a severe form of progressive anæmia, not only in Egypt and in the notable epidemic which occurred among the workmen in the St Gothard Tunnel, but also among the miners and bricklayers in Rhenish Prussia, where the disease was contracted by drinking water containing the ova. In Germany the disease was recognised by the detection of the ova in the fæces, and has proved very amenable to treatment by the freshly prepared extract of the male shield fern. The possibility was suggested that the same agent might be the cause of some of the forms of pernicious anæmia in this country, and it was recommended that in all cases of pernicious anæmia search should be made for the ova.

3. *Dr James Ritchie* showed—(*a.*) A specimen of LARGE POLYCYSTIC KIDNEY from a man, J. P., æt. 53. Only the right kidney could be obtained; it was considerably smaller than the left one, and measured 8 inches long, 5 inches broad. It was rather lobulated than nodulated, surrounded by much dense white fibrous tissue; large and small cysts projected from its surface. On section the capsule was very much thickened; the most striking feature of the kidney was the heterogeneity of its structure. One portion, about 3 inches long by about 1½ inch broad, presented the appearance of kidney structure, but it was pale, firm, with only a cyst here and there, and with iodine there was seen the change in the glomeruli characteristic of waxy disease. A much larger portion seemed to be transformed into cysts of different sizes, most of them with solid or semi-solid contents; the lower portion of the kidney had some resemblance to a sponge, and gave the impression of numerous small collapsed cysts. The kidney differed from the usual appearance of large polycystic kidney in so far that it was much more firm, and that the cyst contents were mainly solid or semi-solid; comparatively few of the cysts had fluid contents. The patient had for a number of years suffered from symptoms which, when they are associated with renal tumour and polyuria, Dr Ritchie believes to be characteristic of polycystic kidney: these are occasional attacks of paroxysmal pain in the lower dorsal region, sometimes accompanied by hæmaturia. Three years ago, when the patient was first seen by Dr Ritchie, there was a very

large tumour on each side, so large that the venous circulation in the vena cava was seriously interfered with. There was an extensive varicosity of both lower limbs and of scrotum, and there was a considerable compensatory dilatation of the superficial veins of the abdominal parietes. On each side the colon could be both seen and felt as it crossed in front of the renal tumour. The difficulty of diagnosis was increased somewhat by the presence of pus in the urine, sometimes in considerable quantity. This had continued for years. The long continuance of purulent discharge, the presence of a rather large amount of albumen in the urine, latterly 12 per cent., and the existence of a degree of œdema of ankles notwithstanding very great polyuria, led to the suspicion of waxy disease in addition to cystic disease of the kidney. The results of post-mortem examination showed that waxy disease existed. Two points of special importance were referred to. The first fact was one which Dr Ritchie had not noticed in the recorded histories of eighty-nine cases which he had collected. During the last year of the patient's life there was a marked diminution in the size of the tumours, and a corresponding subsidence of pressure symptoms. On one occasion the patient passed in the urine a very large quantity of a material which he described as being like thin porridge; this continued for upwards of twenty-four hours. Possibly it was due to the rupture of a cyst into the pelvis of the kidney or some other part of the tract. Then the condition of the lower end of the right kidney, apparently a mass of empty collapsed cysts, raised the question, Is it possible that the contents of these cysts may have been absorbed? The other point of special interest was that, while the patient was suffering from very marked symptoms of what is called uræmia, among those headache, sickness, and marked dyspnœa, the air entering every part of the chest freely, he was passing 73 oz. of urine in twenty-four hours, sp. gr. 1016, and this contained 293 grains of urea. The diet at this time was very limited in quantity, and chiefly milk and bread. The amount of urea excreted was greater than is often found, even when there is no symptom of what is called uræmia. Consciousness was retained up to within a few hours of death; there was no tendency to general convulsions.

(*b.*) A RUPTURED HEART from a lady, aged 77. She had somewhat advanced cirrhosis of kidney, with retinal hæmorrhages and other eye changes. She had also had two slight apoplectic seizures. While lying quietly in bed, about two o'clock A.M., this old lady had been seized with severe præcordial pain; this was partially relieved by a sinapism; several hours' sleep followed, and a moderate breakfast was taken. When seen early in the morning she was still suffering; had on another sinapism; pulse 100, rather feeble; heart-sounds also feeble, but no abnormal sound; the surface of the body was cold and clammy. She was able to take a light dinner, but in the afternoon there was an exacerbation of pain, and

she died suddenly fourteen hours after the first symptom. On post-mortem examination the pericardium was found to be distended with fluid blood. The rupture was a partial one, not extending into the ventricle. The position was that in which rupture most frequently occurs, viz., on the anterior wall of the left ventricle near the septum, not very far from the apex. The degeneration of the heart wall was not uniform, but in some places very advanced. The ruptured portion did not to the naked eye seem to be in an advanced condition of degeneration. In 71 per cent. of cases death is rapid; if the patient is seen during life, the pulse is weak, irregular, soon imperceptible, and collapse is very marked. In this case it occurred slowly. When the patient was first seen, viz., about eight hours after the earliest symptom, although the pulse was rather feeble, it was regular, and not very rapid. In all prolonged cases probably the rupture, as in this case, is only partial. It usually occurs during exertion; in the case referred to the patient was lying quietly in bed when the first symptom occurred.

4. *Dr William Russell* showed—(*a.*) A GALL-STONE UNDERGOING DISINTEGRATION. The specimen was taken from the body of an old woman. The gall-bladder was firmly contracted on the mass of calculus, but, on incising it, it was seen to contain a small quantity of a slightly greenish-yellow creamy fluid, while the solid contents consisted of a large irregular calculus with irregular fractured edges and surfaces, and a mass of smaller fragments with sharp edges and points, evidently derived from disintegration of the larger mass. The wall of the gall-bladder was thickened, and its inner surface was catarrhal. Dr Noël Paton had kindly examined the calculus, and found it to consist mainly of cholesterin.

(*b.*) A specimen of advanced FATTY INFILTRATION OF THE HEART in which there was a great deposit of fat on the surface of both ventricles, which had encroached considerably upon the thickness of the muscle of both, and had also very extensively invaded the remaining muscular substance—the right ventricle more especially—and to such a degree as to be in greater bulk than the muscular substance. The patient had led a very lethargic life, and had slight œdema, but there was no albumen in his urine. There was, of course, evidence of very weak heart. The patient died in the first stage of a croupous pneumonia.

5. *Mr Cotterill* showed the parts removed from a case of CARCINOMA OF THE THROAT, in which he had performed tracheotomy and gastrostomy with great relief to the patient during the last five months of life. The disease was situated opposite the cricoid cartilage, and had been in existence about one year before the patient was admitted to the Infirmary. There had been early communication brought about by the growth between the trachea

and œsophagus, but though this was followed by several abscess formations in the cellular tissue in the neck, it was not marked by any symptoms referable to passage of food into the air passages. The larynx becoming involved, tracheotomy was found necessary in August, and this entirely relieved her of all discomfort in this direction. The operation was made difficult by the fact that the growth had pushed the trachea very much to the side, and overlapped it to such an extent that the incision had to be made through tumour growth to reach the trachea. A few weeks later, as swallowing had become very difficult, and the patient was losing flesh at the rate of 1½ lb. a week, Mr Cotterill performed gastrostomy. The usual oblique incision having been made, the fibres of the rectus were separated, and the stomach stitched to the abdominal wall by six stitches set back about an inch from the edge of the opening in the abdominal wall. This plan gives a wide and excellent attachment of the stomach to the parietes, and the patient was able to take a large quantity of food by the wound without the least trouble from regurgitation. The patient survived the operation for five months, and remained in comparative comfort. The tumour was a squamous epithelioma.

6. *Dr James Carmichael* showed the TEMPORAL BONE from a case of septic thrombosis.

IV. Original Communications.

1. *Dr Graham Brown* communicated a NOTE ON CERTAIN CHANGES IN THE CIRCULATION PRODUCED BY PYREXIA.

Dr Byrom Bramwell said that he had listened with great pleasure to Dr Graham Brown's interesting communication. The apparatus which Dr Graham Brown had shown them was very ingenious. He did not venture to express any opinion as to the bearing of Dr Graham Brown's results. The paper consisted of a series of observations and facts. What bearing those facts might have on the pathology of fever he did not venture to surmise. The view that the elevation of temperature in fever was beneficial was not, of course, a new one; Nothnagel, in particular, had insisted upon it. Possibly the increased facility with which heated (febrile) blood passed through the bloodvessels was, as Dr Graham Brown supposed, a beneficial factor, and tended to relieve the heart of some of the strain which a continued febrile condition threw upon it.

Dr Gillespie asked if, seeing that the numbers indicating the change of viscosity in solutions of the different proteids were so similar, Dr Brown would say what the strength of the solutions were, or if they were the same? And also, seeing that the figures were so similar, whether concentration of a solution exercised much

effect? The increased ease in the flow of the blood in pyrexia must have a marked effect on the process of phagocytosis.

Dr Graham Brown, in reply, thanked the Society for the attention given to his paper.

2. NOTE ON BIER'S NEW METHOD OF TREATING STRUMOUS DISEASES OF THE EXTREMITIES BY PASSIVE CONGESTION.

By A. G. Miller, F.R.C.S.E., Surgeon to, and Lecturer on Clinical Surgery at, Edinburgh Royal Infirmary.

Mr President and Gentlemen,—In presenting this note (I can hardly call it a report) of my clinical experience of Bier's congestion treatment of tubercular affections of the extremities, I hope (though I have nothing great to lay before the Society) to be able to show that the method is useful, and to induce other surgeons to give it a trial. It has already attracted some attention both in this country and on the Continent.

Before, however, saying any more, I must give a description of the method, for some may not be familiar with it. The procedure is very simple. It consists in placing a broad elastic band round the affected limb, a few inches above the diseased part, firm enough to produce venous congestion. Bier recommends that this congestion should be kept up continuously, and that the patients should be permitted and even encouraged to use the limb. The elastic band should be broad, and a layer of lint or wool should be placed under it to protect the skin. The point of application should also be changed every day or two to prevent abrasion. The distal portion of the limb is supported by a common roller up to the affected part, so that the congested area is limited to the immediate neighbourhood of the disease.

No other apparatus or treatment is employed by Bier in his cases. As an example of the method of application, take a case of disease of the elbow joint. The hand and forearm are bandaged, then the elastic is applied to the middle or lower third of the upper arm, firm enough to produce congestive discoloration of the neighbourhood of the elbow. Congestion is what is wanted, not œdema, still less anæmia. Pain is never caused, and if the compression be uncomfortable at first, the patient soon becomes accustomed to it.

An account of Bier's method is given by him in the *Centralblatt für Chirurgie*, 1892 (Beilage No. 32, p. 57).[1]

He records upwards of twenty cases that were treated in Prof. Esmarch's wards at Kiel by this method, and reports that "in most

[1] Dr Bier has also published a more extended account of his method under the following title, *Behandlung Chirurg. Tuberkulose der Gliedmaassen mit Stauungshyperämie*, von Dr A. Bier, 1893.

of the cases the improvement attained was very rapid and striking, and in no case did a change for the worse occur."

Dr Bier, who is Prof. Esmarch's hospital assistant, says that the method is practically the same as that recommended by Helferich for ununited fractures. I have been unable to find any reference to Helferich as an authority on this subject, but from my friend Mr C. W. Cathcart I have ascertained that the late Mr Thomas of Liverpool was in the habit of applying what he called the "damming" treatment along with "percussion" to fractures in which there was delayed union. The damming of the circulation in the neighbourhood of a fracture was managed very much in the way Bier has described, the main difference being that Mr Thomas kept up the congestion only for a few minutes.[1]

Also through the kindness of Mr Cathcart, I have ascertained from Mr Robert Jones of Liverpool, nephew of the late Mr Thomas, that Mr Thomas, some years ago, explained his "percussion and damming" method to a German Professor called Helferich, who probably had mentioned it to Dr Bier, and perhaps the method of treatment had become associated with Helferich's name in Dr Bier's mind.

Dr Bier in his paper says that the idea of applying the congestion method to strumous affections was suggested to him by the old belief that "a congested lung possesses an immunity against tuberculosis."

From an article on "The Association of Pulmonary Tuberculosis with Disease of the Heart," by Dr Percy Kidd, in *St Bartholomew's Hospital Reports* for 1887, I gather that this dogma is attributed to Rokitansky, who stated that "all cyanosis is incompatible with tuberculosis." Dr Kidd says that this opinion is supported by Laennec, Franke, Niemeyer, Fagge, and others, while it is opposed by Peacock, Pollock, and Lebert, who point out that phthisis is frequently associated with *congenital* heart disease. Dr Kidd himself records forty-one cases in which endocarditis, aneurism, mitral incompetence, and other heart affections were associated with phthisis. In all these cases the tuberculosis was chronic.

Dr Kidd, at the conclusion of the article, which seems to be of an exhaustive nature, says, "It is clear that Rokitansky's doctrine is too exclusive, but at the same time it expresses an important truth." He explains the association of phthisis with congenital heart disease thus: "Such persons are born with imperfect lungs; and it is not to be wondered at that these organs, which are inadequately supplied with bloodvessels, should be prone to so common a disease as tuberculosis."

Dr Kidd's conclusion is: "On the whole, it seems that Rokitansky's view is true, though in a more limited sense than he intended."

[1] Mr Thomas published his method of treating ununited fracture in 1886.

My attention was first attracted to Bier's congestion method by a letter which appeared in the *Lancet* of the 19th November 1892, from the pen of Mr Herbert Page of St Mary's Hospital, London, who had then just returned from Kiel, and who wrote in high praise of the results which he had seen in Prof. Esmarch's wards.[1]

I at once commenced to put the congestion method in practice, and had ample opportunity, for we have always a large number of strumous cases in the surgical wards of the Edinburgh Royal Infirmary.

The method which I employed at first for about three or four months was to put on the elastic compresser for only ten or twelve hours every alternate day,—that is to say, the bandage was put on in the morning and removed at night, and left off altogether for thirty-six hours. I was afraid to risk the continuous congestion of the limb.

My experience was that venous congestion was quickly produced and maintained without any discomfort to the patient. Œdema was seldom seen. I always employed some other apparatus, however, for supporting or fixing the diseased part when a joint was affected. Improvement seemed to result at once, and more quickly than usual. But then one always welcomes a new remedy that comes with a good recommendation, and one is apt to think very favourably at first of its effects.

The cases in which I employed this remedy were joint and skin affections. The improvement in the latter was more marked and striking than in the former. In one case of lupus affecting both feet, one foot was congested, while the other was merely blistered (a method of treatment which I have found very useful in tubercular affections). The congested foot improved more rapidly than the other, and from being the worse became the better of the two, and is so still (patient shown). Both feet, however, were subsequently scraped. My friend and colleague, Dr Norman Walker (Assistant Dermatologist to the Edinburgh Royal Infirmary), watched this case along with me; and the method of leaving off the elastic band for thirty-six hours enabled us to observe the exact progress of the case very accurately. We noticed the improvement of the congested foot to take place in one particular especially, viz., in the disappearance of the most important (because most difficult to treat) part of the disease, viz., the marginal papules and scattered foci, which to this day have not reappeared.

In regard to the joint affections I cannot speak so confidently; and as I could not keep my patients long enough to give a full and extended trial to the method, I must speak very guardedly.

[1] Perhaps I should explain here that I attributed the discovery of this congestion method to Prof. Esmarch, and called it by his name until quite lately, when my friend Mr F. M. Caird, who had been at Kiel and seen Dr Bier, corrected my mistake.

I would say, therefore, that the joints seemed to improve somewhat faster than they would have done had they been treated by mere rest. But in every case I resorted ultimately to immobilization or some other treatment. This was forced upon me in all cases by the pressure of time and want of accommodation in my wards.

It will be seen, therefore, that my experience has not equalled that of Dr Bier, who speaks of "very rapid and striking improvement."

For a second period of three or four months I tried the *continuous* congestion. I did not find this any improvement. Œdema usually occurred, and the parts became paler, so that the congestion was apparently not so marked. Besides, the elastic compression had to be left off for a day or two before one could observe the changes that had actually taken place in the part.

Both plans of applying the compression were tried in a case of disease of the ankle joint, and I was better pleased with the interrupted than with the continuous. Marked improvement took place, but cure did not result; and a relapse occurring after the patient (a young woman) was sent home, excision of the joint had ultimately to be performed. At the operation it was seen that the disease had not spread from the synovial membrane to any of the bones. In this respect, therefore, the treatment may have been beneficial. During the last two or three months I have applied congestion occasionally, employing the intermittent method only, but I now apply it daily; that is to say, the elastic band is put on above the joint or diseased part every morning, and removed every evening.

A lad from Arbroath was sent to me to have his elbow joint excised for very chronic strumous disease. The congestion treatment was employed for some time, then blistering was added, and lastly, a plaster-of-Paris case was put on, and in a comparatively short time (six weeks) the lad went out apparently quite well, and with a very useful arm. He went to work too soon, however, and came back a few weeks ago with a return of the disease. The elastic band was again applied, with blistering, followed by a plaster case, and I have the pleasure of showing him to you to-night, with a fairly useful arm,—a better result than one usually gets in hospital practice.

I have not attempted to tabulate a series of cases, because an extended trial of this new remedy on a considerable scale would have necessitated my keeping a number of patients in my wards for a long time,—a thing which cannot be done in the Edinburgh Royal Infirmary on account of the scarcity of beds compared with the multitude of patients urgently requiring accommodation and treatment.

What I have to record is little more than impressions, but these have been formed from frequent, careful, and, I think, critical

observation of the cases in which I have employed Bier's congestion.

Besides the cases already referred to, I have used this method in about twenty other cases. And the result of my experience is that I now employ the congestion method as part of my routine treatment for mild cases of strumous joint disease and skin affections of the extremities. It certainly does no harm; it can be combined with immobilization, and aids its action, I think. Besides, it is very inexpensive, and easily applied. I do not think that this new method can take the place of amputation, excision, incision with scraping, nor of immobilization; neither do I think it very appropriate for hospital cases, because so much time is necessarily required in order to carry it out properly, as I have already stated; but I do think that the remedy is well worth a trial.

Although I am well aware that a few months' experience is not much to go upon, still I think I am justified in recommending the employment of this congestion treatment in the following cases:—

1. Tubercular skin affections of the extremities.
2. Early tubercular disease of joints (combined with immobilization or blisters), especially those in which time is of no great importance.
3. Instances of multiple tubercular disease, in which more radical treatment is inappropriate.

As an example of the last class, I would mention the following case:—

B. C., aged 25, admitted 12th December 1892, suffering from tubercular disease of the left ankle, right elbow, little finger of right hand, and right patella. The left foot and little finger were amputated, while the elbow and patellar disease were treated by Bier's method, with the addition of a splint in each case. After three months the patient left the hospital with the elbow much the same, while the disease of the patella had quite disappeared. At this date the elbow is still much the same, the knee well.

I would now venture to discuss in a few words, not the *method*, but the *theory of action* of this new remedy. Bier founds this new treatment (as we have seen) on Rokitansky's statement that "a congested lung possesses an immunity against tuberculosis." Dr Kidd admits that this is practically true; and some one, I have heard, has suggested that could we damage the mitral valves we might cure all cases of phthisis pulmonalis.

Mr Page, in his letter above referred to, suggests that there is a resemblance between this method of treatment and that by Koch's tuberculin. In the latter, marked congestion of the tubercular part is produced, as every one knows who has seen a case of lupus of the face so treated. Mr Page also refers to the beneficial effects of erysipelas on lupus, pointed out by Mr Jonathan Hutchinson.

I have already stated that I have great faith in blisters; and it seems to me just possible that these various remedies act in much the same way, viz., by bringing more blood and serum to the tissues infected with the tubercle bacillus, thus enabling the tissues to combat these bacilli more effectually. It is said that tubercular affections have a tendency to disappear spontaneously. This was first impressed on my mind by Dr Littlejohn long ago, when in post-mortem examinations (of medico-legal cases) of apparently healthy persons he frequently demonstrated to us, his students, cicatrices in the lungs. My own experience as a surgeon has convinced me that this is true in certain cases. For if a tubercular joint is kept thoroughly (and long enough) at rest, it is very likely to recover,—damaged more or less, perhaps, and liable to a recurrence or recrudescence of the disease from an injury or some such exciting cause, but still to all appearance free from disease, and sometimes wonderfully useful. Given, then, that there is a tendency to recovery, might not an extra amount of *blood* and SERUM favour this? If (as seems to be the case) a congested lung has a better chance in a contest with tubercle, why may not a joint or other tissue be strengthened also by congestion?

In connexion with this subject there is a condition associated with tubercular joint and bone disease which I have observed, but which, so far as I know, has not received much attention, viz., that the arteries supplying the limb are unusually small. If, for instance, amputation in the thigh should be necessary for tubercular disease of the knee joint, I have noticed that the femoral artery is much smaller than one would expect to see it in a case of amputation for injury or sarcoma. Of course all arteries contract when cut, but I am sure that in tubercular cases they are much smaller than in the other instances I have referred to.

It is well known that limbs affected with tubercular joint disease become atrophied. The muscles go first, very markedly, but the bones suffer also. Every one is familiar with the shrivelled appearance of such limbs. Might not this be caused by the contracted condition of the main arteries and deficient blood-supply? The atrophy is much more likely to be the result than the cause of such contraction. But I must not let myself be led astray into a discussion of this point, for I hope to be able to bring before this Society, some other time, this question of atrophy connected with tubercular joint disease.

Let me suppose, then, for my present argument that the blood-supply does become deficient in a tubercular limb or part (through reflex inhibition of the arteries), and that in consequence the diseased part is unfavourably situated as regards its contest with the tubercle bacilli, might not congestion of the neighbourhood assist in the destruction of the bacilli and the throwing-off of the disease? In other words, is this not simply another case of "the survival of the fittest," and "victory being on the side of the

strongest battalions?" May not Bier's new treatment act beneficially by providing more blood and serum for the diseased part, and so deciding the battle against the bacilli?

Mr Caird said that any one who referred to Bier's initial paper[1] would be struck by the originality of his method, the ingenuity exercised in its application, and the train of thought which led to its introduction. He had himself seen excellent results gained by it under the care of Bier in Kiel in summer 1892, but his own personal experience was as yet too limited to enable him to express an opinion. He proceeded to quote from a letter written in September, wherein Dr Bier stated that he had already the experience of over 150 cases; that it was possible with absolute certainty to cure by the method a not yet softened and skin-whole tuberculosis, but that treatment must extend over a year or more; that, when large foci were present in bone, cold abscesses rapidly ensued; and that these should be punctured and injected with iodoform and glycerine. Furthermore, Dr Bier advised a trial to be made, in the first instance, with cases of tubercle in which the skin was intact, since when the skin was broken much time and experience in using his method was necessary.

Dr Brakenridge said that his own experience went to confirm Rokitansky's view that it was extremely rarely that one met with pulmonary tuberculosis in cases in which there was heart disease and congestion of the lungs. He had only seen two such cases. In one there was reason to believe that there was lung disease before the heart disease, and in the other there was no loss of compensation, and therefore no lung congestion. Mr Miller had, some years ago, mentioned to him a case in which, after amputation at the hip-joint, a pre-existing tubercular disease in the lungs had rapidly improved, owing, probably, to increased blood-pressure in the lungs. He thought that this paper was exceedingly interesting from the medical point of view: for, at a time when efforts were especially directed to destroying tubercular disease outside the human body, so as to prevent the risk of invasion from without, it was well to recognise and accentuate the fact that there were vital and physical forces within the body by which invasion might be prevented or actual attack repelled.

Dr P. A. Young said it had also been stated that deformity of the chest tended to prevent tubercular disease of the lungs. It was probably these observations that had suggested the use of carbonic acid gas as a therapeutic agent; and he wished to remind the Society that there was waiting in the hands of the Royal College of Physicians a prize of a hundred pounds for the best paper on the use of carbonic acid gas in medicine.

Dr Norman Walker said he could testify to the great improvement which had taken place in the foot of the girl Mr Miller had

[1] *Behandlung Chirurgischer Tuberculose mit Staunngshyperœmie*, Lipsius and Tischler, 1893.

shown to the Society. The nodules, which in his experience were almost invariably left behind by other methods of treatment, were no longer present. He agreed with Mr Caird's remarks regarding cases seen in visiting foreign hospitals. They had cases shown to them there, and were told that they had greatly improved, but when they came home and tried the same treatment they did not get the same benefit from it. He thought that there were many cases of tuberculosis of the skin that were best treated by congestion, however it might be produced. When the skin was thickened, and there was a great deal of fibrous tissue in the corium, then congestion was most useful. He believed that blisters, and various ointments used, really acted by simply causing congestion. The treatment was not applicable to the ulcerative form of lupus. He thought that the method of Bier was well worth adding to our other forms of treatment in many cases.

Dr James Ritchie said that this plan of treatment raised the question how far are these changes in tubercular tissue due to physical, and how far to vital alterations? Some of the speakers had not discriminated between active and passive congestion. In Bier's method there must be a marked increase of pressure in the capillaries of the included area. It was well known that during pregnancy tubercle often remained in abeyance, and during pregnancy there is an increase of blood-pressure.

Mr Cotterill said he had tried the method in several cases, but he had not been able to convince himself that any good had come of it. He had always tried it in cases in which he could contrast two sides. In order to get anywhere near the solution of the value of this method, they must get an equal proportion of tubercular cases under similar hospital treatment and compare them with those to whom Bier's treatment was applied. He thought that a very great deal of the improvement put down to this method had been due to the very improved conditions in which the patients found themselves in hospital. It seemed to him to be a little peculiar that this method should do good, when one remembered that the place in which tubercular disease of bone was most of all apt to appear was the epiphysis, which was the part best supplied with blood. It was strange if at a later stage a little more blood should stop the process.

The President thanked Mr Miller for his valuable paper.

Mr A. G. Miller replied briefly, thanking the Society for their kind reception of his paper.

3. ON GASTROSTOMY AFTER THE METHOD OF WITZEL.

By Mr F. M. Caird, F.R.C.S. Ed., Assistant Surgeon, Royal Infirmary; Lecturer on Surgery, Edinburgh School of Medicine.

Gastrostomy is usually undertaken when the œsophagus only permits the passage of fluid food with difficulty, and when the

patient's strength is already giving way. The mortality associated with the operation was formerly great, partly owing to the shock consequent on the low vitality at the time, and partly from the contamination of the peritoneum with gastric contents.

An advance was made, however, when surgeons began to advocate earlier interference, and when the operation was carried out in two stages, so that the opening of the stomach was deferred until adhesions shut off the peritoneum. Under the more favourable auspices created by increased familiarity with peritoneal surgery, it was soon recognised that the danger of septic infection might be avoided, and that the stomach might be opened at once, if it were secured with sufficient firmness to the abdominal wall, and the peritoneum perfectly occluded, so that neither was there chance of the stomach breaking loose if vomiting occurred, nor yet the fear of breaking down adhesions when feeding the patient.

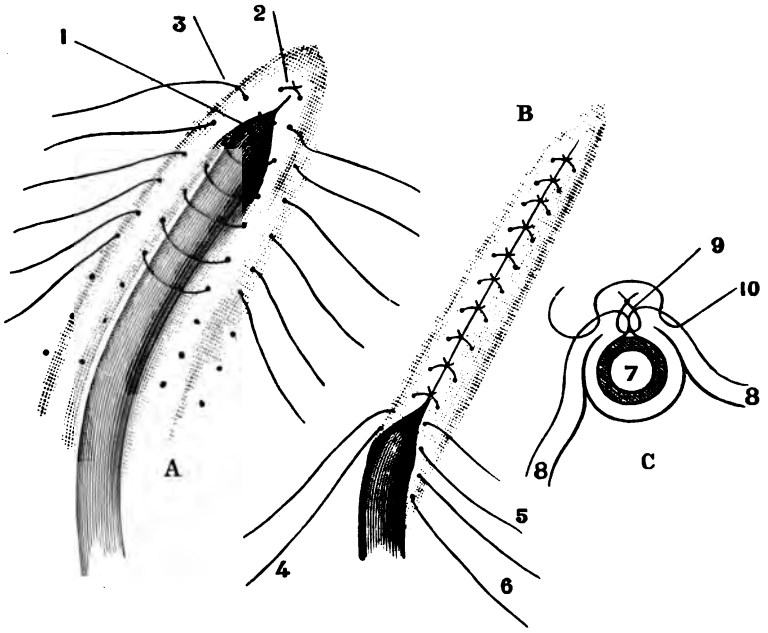
As the result of a successful gastrostomy, the contents of the stomach, fluid and gaseous, were liable to escape; the adjoining skin was frequently excoriated, and the patient was sometimes far from comfortable. Moreover, in cases of simple stricture, if the œsophagus regained its function and became permeable, the closure of the fistula involved subsequent surgical interference.

Ingenious procedures were accordingly devised to perfect a gastrostomy wound which should act like a true mouth, or like a valve, and obviate the distressing leakage. Amongst these may be mentioned the methods of Von Hacker and of Girard, in which a sphincter is formed from the fibres of the rectus muscle; or those of Hahn and Ssabanajew, where, by the projection and opening of a fold or diverticulum of stomach wall between the ribs, or through the soft structures and skin above the level of the original wound, a valve-like mouth is constructed at a higher level than in the ordinary gastrostomy.

It would appear, however, that the most satisfactory plan is that which follows, introduced by Witzel of Bonn.

The patient is anæsthetised, and the customary antiseptic precautions observed. The usual incision is made, the rectus split along the course of the fibres, its sheath and the peritoneum opened. The stomach is then sought for, seized by the fingers, and a portion of the anterior aspect, as large as the palm of the hand, is pulled out at the wound, and packed around with sterilized gauze, moist and warm. The surgeon next opens the stomach. He selects a spot near the lesser curvature, free from vessels, and makes a small incision about ¼ inch in length. He has in readiness about two feet of red rubber tubing, in diameter equal to that of a drawing pencil, and slips about one inch of it into the stomach through the incision, which it accurately plugs. Should there be any excessive bleeding, it may be arrested with the catgut suture, which serves to fix the tube

provisionally. Care must be taken to wipe up any escape of fluid from the stomach. The tube, which hangs across towards the greater curvature, has now to be secured in position, and a species of artificial œsophagus formed. This is managed by the surgeon raising a fold of stomach on each side of the rubber tube with a series of interrupted silk Lembert sutures, on tightening which the tube is buried for about two inches of its length in the



DIAGRAMS ILLUSTRATIVE OF GASTROSTOMY AFTER THE METHOD OF WITZEL.

A. Shows rubber tube passed through slit in stomach, and secured by catgut suture 1. Lembert sutures beyond insertion of tube, 2, 3. The following six sutures are figured in position, but not tightened, and the position of the succeeding three is indicated by dots.
B. Sutures tightened.—Stitches 4, 5, and 6 inserted; the stomach is now returned to the abdomen, and the free ends of 4, 5, and 6 used to unite the stomach to the peritoneum and rectus.
C. Section.—Tube *in situ*, 7. Stomach, 8. Suture of first series, tightened, 9; of second series, loose, 10.

The sutures should be of fine silk, preferably black. If the stomach cannot be easily brought close against the abdominal wall, a provisional tampon of iodoform gauze is used until adhesions form.

folds. Two or three similar sutures beyond the sunk extremity of the tube effectually shut off the new œsophagus from the peritoneal cavity at the further end. A little sterilized iodoform powder is rubbed over the stitches, and a second similar series of sutures are put in over the first to promote the efficient union of the serous surfaces over the tube. The stomach should now be

returned, and secured to the abdominal wall. Before returning it, a few loose sutures may be passed through the folds and outer portion of stomach wall at the free extremity of the rubber tube; and on replacing the stomach the loose sutures are employed in fixing it to the abdominal wound, which may now be closed. The surgeon there and then attaches a funnel to the rubber tube, and runs in as much food as he thinks necessary. The whole operation may be easily completed within thirty minutes.

The result obtained is most gratifying. The patient speedily learns to feed himself, and there is not the slightest fear of any regurgitation of food through the wound, since the tortuosity of the new channel and the valve-like action brought about by the contraction of the stomach entirely preclude any such possibility. The tube should be removed about once a month. In order to avoid any difficulty, it is well to cut off the free surplus of the old tube, and pass a long-eyed probe into the stomach through the portion that remains, which may now be removed. The new tube should be strung on a silken thread, the end of which is now to be attached to the probe, and so one readily slides the new tube over the probe onwards into the stomach, and, pulling on the silk, thereafter withdraws the probe. Should the œsophagus again regain its function, as in cases of cicatricial stricture, it is noteworthy that on withdrawal of the tube there is never any outflow of fluid, and the fistula rapidly heals.

The autopsy in cases examined several months after the operation has shown that the new canal gradually shortens, straightens, and its walls become thicker. The inner extremity is found guarded by a funnel-shaped arrangement of concentric folds of mucous membrane, or it projects inwards something like the ileo-cæcal valve or entrance of the ureters, thus presenting an efficient valvular defence against escape of the stomach contents.

Several points may be further illustrated by a case.

E. F., æt. 14, servant girl, was admitted to the Royal Infirmary August 17th, 1893; complains of inability to swallow. She was miserably emaciated; had sunken eyes; pale, hollow cheeks; an anxious expression. Pulse weak and small, and temperature 97° Fahr. She was herself too weak to give any history. Her sister states that five months ago the patient swallowed a mouthful of strong solution of washing soda which she found in a lemonade bottle. She at once felt extreme pain, fainted, and three hours after began to vomit. She has been in bed ever since the accident, suffering from difficulty in swallowing, which has steadily increased. During the last three weeks she has taken hardly any food at all, and for the last seventy hours not even fluids have been swallowed. Within the last three days a great change has occurred, and she is much weaker. On the morning after admission Witzel's operation, as above described, was performed, since her condition appeared

critical. Three ounces of switched egg and half an ounce of brandy were at once passed into the stomach; feeding with egg and milk was afterwards carried out every four hours. She rapidly improved. The wound was dressed once or twice, and she got out of bed on the fourteenth day. On this date she weighed 4 st. 2½ lbs. She gained at the rate of about 1 lb. per week. During one week, when she was specially active, she lost 1 lb. Her temperature remained still subnormal. At the end of four weeks she was ordered to masticate and pass all her food and fluids through the mouth before sending it through the tube into her stomach. At once she began to put on flesh, her temperature rose to normal, and she gained 10 lbs. in a fortnight. Since that time she has gained about 3 lbs. a week, and now weighs about 6 st. At present she is healthy, active, and well. She suffers no inconvenience whatsoever beyond that at meal times. Not a drop escapes alongside the tube; closure is perfect; and the clamp on the tube prevents any regurgitation during exercise, coughing, or laughing. A very small quantity of liquid can be swallowed, but the stricture, which is situated about 10 inches from the mouth, defies our best efforts, and not even a filiform bougie has yet been passed.

A second case, in a male æt. 40, who suffered from impermeable cicatricial stricture, also gave a successful result. The patient died from chronic lung mischief two months after the operation. There was no sectio.

In conclusion, we might again press the claims of this operation upon the practitioner. It offers such certain relief to the unfortunates who suffer from œsophageal stricture, with such slight risk, and the after-result is so satisfactory, that it gives additional arguments to urge in favour of early operative intervention. Moreover, the principle involved in this operation of Witzel is so valuable, and so capable of modification and application to the other hollow viscera, that it is a welcome addition to our surgical methods. It is to the excellent results seen in the hands of Prof. Mikulicz in Breslau that the writer owes his introduction to the benefits of Witzel's gastrostomy.

References.

1. Witzel.—"Zur Technik der Magenfistelanlegung," *Centralblatt für Chirurgie*, 1891.
2. W. von Noorden.—"Beitrag zur Technik der Gastrostomie bei œsophagusstenosen," *Berliner Klinische Wochenschrift*, 1893.

Owing to the late hour, there was no discussion upon this paper.

Meeting III.—December 20, 1893.

Dr CLOUSTON, *President, in the Chair.*

I. EXHIBITION OF PATIENTS.

1. *Dr Bramwell* showed—(*a.*) A case of PSORIASIS treated by thyroid feeding. The patient, a girl aged 17, had suffered from the disease for two and a half months before she came under Dr Bramwell's care (on 7th September 1893), and had been treated for six weeks in one of the wards of the Infirmary by a variety of external and internal remedies, without any improvement taking place. From 13th September to 14th October moderate doses of Brady & Martin's thyroid extract were administered in 5, 10, 15, and 20 minim doses (on the 13th, 20th, 27th September, and 5th October); the result was distinct but not marked improvement. On 14th October Duncan & Flockhart's extract was then substituted for Brady & Martin's preparation (which had run short), in 1, 2, 3, 4, and 5 drachm doses, the latter dose (equal to $\frac{1}{8}$ of a gland) being continued from the 8th to the 25th November. During the time that the patient was taking Duncan & Flockhart's preparation there was slow improvement; it seemed to come to a standstill about the 14th November, and many new patches of eruption developed on the scalp. On 20th November the patient was placed for four days on milk diet, and a dose of cascara ordered each night, for the bowels had been constipated. The milk diet was continued till, on 25th November, Burroughs, Wellcome, & Co.'s tabloids were substituted for the liquid extract, and immediately afterwards a notable improvement took place. One, two, three, four, and finally five tabloids were given per diem. On 20th December, when the patient was shown to the Society, an immense improvement had taken place. She is now (15th January) quite well; the skin being beautifully soft and healthy all over the body. (The patient was shown to the Society on 17th January. Photographs showing the appearance of the patient before treatment were exhibited at the meeting.) The case showed that in order to effect a cure it is necessary in some cases to administer large doses of the thyroid extract, and to continue the treatment for long periods of time. In some of the cases in which the remedy seems to have failed, it is probable that the failure was due either to an insufficient dose, to a too short period of administration, or to the fact that the patients were not kept under continuous observation in the wards of a hospital. The last is probably an important point.

(*b.*) A case of LUPUS which has undergone very great improvement as the result of thyroid treatment. The patient, a girl aged 17, had suffered from the disease for nine years; and during that

period had been subjected to a number of different plans of treatment, including the injection of Koch's tuberculin. The latter plan of treatment had been followed by some improvement, which was, however, only temporary. The patient was sent into the Infirmary by Dr Allan Jamieson (to whom, and to Dr Norman Walker, Dr Bramwell was indebted for the case), with the object of having the face scraped. (Photographs were exhibited showing the condition of the disease before, during, and after the thyroid treatment.) The patient had been continuously under treatment either in or out of hospital for eleven months. Dr Bramwell said that he had given the thyroid extract in this case of lupus partly as an experiment. After seeing the rapid recovery which occurred in some cases of psoriasis, he thought it only right to try the remedy in lupus. But in addition to this purely experimental reason, he had given the remedy with a definite purpose. He thought that it was not unlikely that the secretion of the thyroid gland had some influence in protecting the body against tubercular lesions; or, to put the matter in another way, that the absence of the thyroid secretion perhaps predisposed to and favoured the production of tubercle. He based this opinion on the fact that many myxœdematous patients died from tuberculosis. In his article on "Myxœdema" in the first part of his *Atlas of Clinical Medicine*, he had referred to a remarkable case which occurred under the care of Dr Mackie-Whyte of Dundee, in which a patient, aged 72, died from diffuse tuberculosis. The disease at that time of life in a diffuse form was extremely rare. (Professor Greenfield had also directed attention to the fact that myxœdematous patients often die from tubercle.) This and other cases seemed to show that the absence of the thyroid secretion from the blood and tissues of the body predisposed to the production of tubercle. Now, if this is so, it was not unreasonable to suppose that the administration of thyroid extract might be a preventive against tubercle, and a beneficial remedy in tubercular lesions of the skin, and perhaps of the internal organs. The remarkable success which had attended the administration of the remedy in this case of lupus was in some degree perhaps a confirmation of this theoretical opinion which he (Dr Bramwell) had formed by the logical process just indicated. Several other very wide and important therapeutic questions and possibilities had also occurred to him, but he would not refer to them on the present occasion. In this case of lupus it was at once apparent that the thyroid extract produced a marked diminution of the vascular injection round the lupus nodules. To test this point thoroughly the remedy was on several occasions omitted for a week, and then again administered; the diminution in the vascularity of the skin lesion which invariably resulted after a few days of thyroid administration was apparent to every one who was watching the case. The patient had slowly but continuously improved; the disease was not yet cured, but the

improvement was so marked that Dr Bramwell hoped and expected that in the course of a few months still further improvement, and perhaps a complete cure, would take place. If such an intractable disease as lupus could be cured, or even materially benefited, by the internal administration of thyroid extract, a great therapeutic achievement would undoubtedly have been attained. So far as he knew, no internal remedy which had as yet been discovered had any distinctly curative effect upon lupus. Dr Bramwell said that it was desirable if possible to explain such a remarkable result as that which had already taken place in this case. He hardly thought that the thyroid extract acted as a direct antidote to the tubercle bacillus; it was more likely that the extract improved the condition of the skin, and enabled the tissues to overcome, eradicate and expel, as it were, the tubercular lesion. If this explanation was correct, it was only reasonable to suppose that in lupus the cure would necessarily be a very slow and gradual one. It was possible, however, for the reasons given above, that the thyroid extract exerted a more direct antagonistic influence upon tubercle bacillus, and therefore upon the lupus lesions in the skin.

(*c.*) A case of LUPUS, in which treatment had only just been commenced. The patient, a girl aged 18, had suffered from the disease for nine years. The disease was very extensive; the face had been repeatedly scraped, and the disease had again and again returned. The patient was admitted to Ward 5*a* under Mr Cotterill's care, in order to have the face again scraped. In going round the ward, Dr Bramwell had seen the patient, and asked Mr Cotterill to transfer the case to him in order that he might try the effect of thyroid treatment. He was much indebted to Mr Cotterill for kindly consenting to this arrangement. Treatment had only just been commenced. He brought the case before the Society in order that they might see the condition of the patient before any effect had been produced. He proposed to bring the patient again before the Society at a future meeting, in order that they might see the result of the treatment, whatever it might happen to be.

2. *Dr J. C. Dunlop* exhibited three patients showing how strong the HEREDITY OF DEFORMITY can be. J. S. had his ring and middle fingers of left hand webbed, his son had an exactly similar deformity, and his grandchild, the child of the second patient shown, had the ring and middle fingers of both hands webbed, and also three toes on both feet webbed. These cases showed a deformity transmitted directly to two generations. Dr Dunlop was unable to trace the earlier history of the family.

3. *Dr Norman Walker* showed a case of EARLY RODENT ULCER in the non-ulcerative stage.

4. *Mr Caird* showed a case of CHARCOT'S DISEASE in both knees.

II. Exhibition of Photographs.

Dr William Russell showed Photographs of cases of LUPUS treated in Berlin with tuberculin.

III. Original Communications.

1. CLINICAL REMARKS ON A CASE OF SPORADIC CRETINISM.

By Byrom Bramwell, M.D., F.R.C.P. Edin., Assistant-Physician to the Edinburgh Royal Infirmary; Lecturer on Practice of Medicine, Edinburgh School of Medicine.

THIS case is a remarkable example of a remarkable disease. The patient, who was kindly sent to me by Dr David Menzies, is suffering from sporadic cretinism—in other words, from the infantile form of myxœdema. She was admitted to the Edinburgh Royal Infirmary on March 30th, 1893. At that time, though she did not look more than 2 or 2½ years of age, her actual age was 16 years and 4 months. She measured only 29½ inches in length, and weighed only 2 st. 5½ lbs. The anterior fontanelle was widely open; it measured 6 by 5½ centimetres. The stumps of the first set of teeth were still present. She was unable to stand, though she could support herself in a semi-erect position by leaning on her chest and arms. She was unable to creep in the ordinary way, but she could pull herself along for a short distance on her belly by her arms. Her intelligence was to all intents and purposes *nil*, but she could see, hear, and taste. Owing to her defective mental development, the condition of smell could not be satisfactorily determined.

During the six weeks that she was under close observation in the hospital she never uttered any intelligible articulate sound; but her mother said that she could say "Da-da" and "Ma-ma." Swallowing was difficult, apparently in consequence of the enormous swelling of the tongue. She was unable to chew, and had consequently to be fed with liquid and soft foods.

The patient looked more like one of the lower animals than a member of the human race. Her facial appearance and expression resembled that of a bull-dog more than anything else. But, notwithstanding these repulsive characteristics and her almost entire want of intelligence, she was the darling of her mother. The case is, indeed, a remarkable illustration of maternal affection. Up to the date of the patient's admission to the hospital the mother had only been separated from her child one night since its birth. It was with the very greatest difficulty that she was persuaded to allow the patient to come into the hospital; she only did so on condition that she should pass the whole of the day with her. Every particle of solid food which the child had swallowed since

its birth had been first chewed by the mother before being put into its mouth.

Family History.—The case presents all the characteristic features of sporadic cretinism, though in a very exaggerated degree. The patient is the eldest of four children; the second child, a girl aged 12 years, is healthy and tall; the third, a boy, died when 1 year and 10 months old, of "cramps in the stomach;" the fourth, a girl, aged 6 years, is very healthy, tall, and strong. There was one miscarriage, between the births of the first and second children. The parents are both healthy people. The father, aged 42, measures 6 feet 2 inches, and the mother, aged 41, measures 5 feet 5¾ inches in height. Both parents come of a healthy stock, and so far as can be ascertained no similar or allied diseases have occurred in any of their relatives.

Etiology.

The parents have lived in their present house for eighteen years; the patient was born at her grandfather's house in the country, where her mother went to be confined. Her mother states that she is unable to account in any way for the development of the disease, unless it was due to a strain of the back which she received when she was five months pregnant. The patient's birth was unattended with difficulty.

Except that the tongue seemed to be unduly large and the skin more mottled than natural, nothing was thought to be amiss with the child until she was nine months old. About this time her mother noticed that she seemed to have stopped growing; she says that the child has hardly grown at all since. Up to this time she had been chiefly breast-fed.

Prevalence of Sporadic Cretinism and Myxœdema in a Limited District of Edinburgh.—But although the parents cannot account in any way for the causation of the disease, there is one fact which is certainly of interest, and perhaps of importance from an etiological point of view. In the part of Edinburgh in which the patient lives, sporadic cretinism and myxœdema are, relatively speaking, so common that they may almost be said to abound. The remarkable cases of sporadic cretinism which Dr John Thomson described in a recent number of the *Edinburgh Medical Journal*, and the typical case of myxœdema which is represented in the first plate in my *Atlas of Clinical Medicine*, live within a stone's throw of this patient's residence; and there were, when I first saw this patient, at least five other cases of sporadic cretinism and some other cases of myxœdema within a radius of half a mile. The extraordinary prevalence of sporadic cretinism in this limited part of Edinburgh is remarkable, and can hardly be a mere coincidence. It seems to suggest that sporadic cretinism and myxœdema (or, rather, the atrophic condition of the thyroid gland, which is the

pathological substratum of myxœdema and sporadic cretinism) are in some cases, perhaps, due to a local or endemic cause. In conjunction with Dr John Thomson, I am endeavouring to obtain further information on the point. We are trying to ascertain the place of residence and place of birth of all the cases of sporadic cretinism and myxœdema which are to be found in the city.

Sporadic cretinism is not a common disease. When I published the first part of my *Atlas of Clinical Medicine* I could only find forty-three recorded cases. But these figures undoubtedly give a very erroneous idea of the frequency and prevalence of the disease. During the past year or two, in consequence of the great interest and attention which have been directed to myxœdema and sporadic cretinism, as a result of the extraordinary improvement which is effected in these diseases by thyroid treatment, a large number of new cases have been recorded. We now know that the disease is very much more prevalent than it was supposed to be three years ago. But notwithstanding this fact, the occurrence of six cases in a limited district of this city is very remarkable, and undoubtedly calls for further investigation.

History of Patient.

Previous Illnesses.—When 3½ years old the patient was very ill with "stoppage of the bowels;" at 5 she had chicken-pox; at 7, measles; at 8, whooping-cough; at 10, scarlet fever; and at 12 years of age, a large glandular abscess on the right side of the neck, which was lanced. Three scars represent the position of the abscess, and show that it must have been severe. Her hair, which was previously pretty thick, began to come out after the attack of scarlet fever; it has not grown since.

The Condition of the Patient before Treatment.—I have said that sporadic cretinism is the infantile form of myxœdema. Like myxœdema, the disease depends upon arrested or defective secretion of the thyroid gland. The symptoms of sporadic cretinism are identical with those of myxœdema. Of course there are differences in detail, but they are easily explained by the difference in age, and by the fact that children affected with the infantile form of myxœdema do not grow and develop. Their mental development and bodily growth are both arrested. The case which I am now recording is a remarkable illustration in point. As I have already stated, the patient at the age of 16 years only measured 29½ inches in length. Her mental development is completely arrested. Though she can grunt and bark like one of the lower animals, she does not seem to be able to produce any articulate sound, and yet she seems to have some sort of dull intelligence. The first night that she was in hospital and separated from her mother she was very miserable. She kept the whole ward awake with her inhuman-like barks, and grunts, and groans, for she could not scream, or cry, or

weep after the manner of an ordinary child. The nurses were unable to pacify her, and the disturbance which she produced was so great that one of the house-physicians had to be sent for. He carried the patient to an empty (delirium tremens) ward, and with admirable fortitude and patience walked her about for a considerable time in his arms. He has since confessed to me that he did not at all relish the experience; in fact, he says that he "got quite a turn." He had not seen the patient before, and he could hardly realize that he was dealing with a human being. He felt as if he were trying to soothe some strange and weird animal. The repulsive and inhuman appearance of the patient, and its brute-like roaring in the dead of night in an empty delirium tremens ward, were sufficient to give most men "a turn." Even the best efforts of this gentleman did not succeed in quieting the patient, and relief was only obtained after the administration of a dose of bromidia. The disturbance which the child created was so great that we reluctantly determined if it was repeated to send the patient home. Fortunately she soon became accustomed to her new surroundings, and except during an attack of influenza, which will presently be described, gave little trouble during the rest of her stay in hospital.

I have said that her facial appearance reminded me of a bulldog. The head was large in proportion to the body. The mouth was of enormous size, and always open. Saliva frequently dribbled away from it. The lips were very thick and blue; the lower lip was everted, and in it there could be seen some large dilated veins. The tongue, which was of enormous size, both as regards length and breadth, and of a dark purple colour, constantly projected between the teeth. The nose was very small, sunken, and snub-shaped; while the nostrils were large, dilated, and set widely apart. The eyes, which were small and bead-like, were partly closed by the œdematous swelling of the lids. There was no blush on the cheeks, but in this respect the case was not exceptional, for the malar blush which is so characteristic of myxœdema is very rarely present in sporadic cretinism. The face was pale, and the skin of the body generally of a dingy yellow hue. The scalp over the position of the anterior fontanelle was destitute of hair; a considerable quantity of coarse, dry, shaggy hair covered the back and sides of the head. The eyebrows were hardly perceptible. The eyelashes in the lower lids were scanty; there was slight blepharitis. The cavity of the mouth was very capacious.

The belly was large, and an umbilical hernia of (relatively) great size projected from it, and added not a little to the extraordinary appearance which the patient presented in the nude condition. (It is a curious fact that an umbilical hernia is nearly always present in cases of sporadic cretinism, but I am not acquainted with any case in which the hernia was so large as in this patient.)

The hands and feet were very broad and thick, and wrinkled

like those of a washerwoman. The legs, thighs, arms, and forearms were firm; the tissues were evidently infiltrated with a solid œdema, for, as the result of the thyroid feeding, the firmness entirely disappeared, and the limbs rapidly became soft and flabby; the solid œdema seemed, as it were, to melt away after a few doses of thyroid extract.

The skin was mottled, and very harsh and dry; the mother stated that the patient never sweated. Several moles and warts, some of them pigmented, were scattered over the surface of the body. There was a pigmented mole on the left side of the trunk, and another on the right side of the neck. The sensibility of the skin was, so far as could be ascertained, quite normal.

The neck was very thick, and a large elastic swelling was situated at the root of the neck above each clavicle. The fatty swellings which are so characteristic of sporadic cretinism and myxœdema were larger in this than in any other case of myxœdema or sporadic cretinism which has come under my notice. There were no pseudo-lipomata elsewhere. The spine was curved towards the right, and the tibiæ were bent as if from the result of rickets. The appetite was said to be good, but the patient was often sick; this, her mother stated, was sometimes due to laughing. The breath had a disagreeable odour. The bowels were very costive. At times the patient was very flatulent. The temperature was subnormal. The mother stated that the patient was always worse during winter, and somewhat better and brighter during the heat of summer. The pulse was of normal frequency. The urine contained a small quantity of globulin. The child paid no attention to the calls of Nature. The mother stated that she slept well and was of a placid disposition, and that she was in the habit of playing with toys; but the degree of intelligence which was present before the thyroid treatment was so slight that I am not disposed to attach much importance to this statement. Like many other mothers, this one had an exaggerated idea of the mental capacity of her offspring.

The child was admitted to the hospital in order to be treated by thyroid feeding. The case was not a favourable one, and I did not expect great things from the treatment; but I was anxious to see whether some improvement could not be effected, and I am glad to say that a considerable amount of improvement has undoubtedly taken place.

I may say in passing that in two other cases of sporadic cretinism I have obtained most satisfactory results from thyroid feeding. One (the case which is reported in my *Atlas of Clinical Medicine*) has apparently been completely cured; the other, a child who has suffered from the disease since it was a year old, is progressing and developing under the thyroid feeding in a very remarkable manner; but I do not propose on the present occasion to go into details with regard to these cases.

Result of Treatment.

The result of the treatment in the case which I am now recording has been as follows:—

Dose of Thyroid Extract Administered.—On *April 1st*, 5 minims of Brady & Martin's extract of thyroid were administered. On *April 3rd*, the dose was increased to 7 drops. Soon after taking the medicine the patient vomited; for the rest of the day she was in a very excited condition, grunting continuously, and laughing in a way which was peculiar to herself. The temperature rose to 99°·4. On *April 4th*, the dose was reduced to 5 minims. On *April 9th*, 5 minims were given in the morning and 3 minims at night. The same dose was repeated on the *10th* and on the *11th*. In consequence of the larger dose the patient became very excited, could not sleep, and was for several hours in what can only be termed a hysterical condition. The dose was consequently on the *12th* again diminished to 5 drops. The state of excitement was followed by considerable depression. On *April 14th* and *15th*, 7 drops, and on the *16th*, 10 drops, were administered in two doses, one in the morning and one in the evening. As the patient again became excited the dose was finally restricted to 5 minims once a day. This seemed to be the maximum dose which could be borne satisfactorily.

Results of the Treatment.—April 8th.—The treatment had already produced a very marked effect; the temperature had risen at least a degree and a half; the swelling of the tongue and lips and body generally was very much less marked (see Table of Measurements); the patient swallowed better than she did; she looked brighter, and seemed to fix and follow an object with the eye in a way she did not do before; the mouth was now frequently closed; this was never observed before the treatment; the skin was not nearly so rough and harsh.

On *April 17th*, it was noted that the patient looked very much brighter, and was much thinner; the firm myxœdematous infiltration of the tissues seemed to have entirely disappeared; the skin was much less harsh and dry, and peeling was beginning on the legs and feet. Her mental condition was much more lively; she took much more notice of things than she used to do. The constipation had almost entirely disappeared. She had lost 3½ lbs. in weight since the treatment was commenced, and this notwithstanding that she was eating well; she then weighed 2 st. 2 lbs. She was taking three pints of milk in the twenty-four hours, in addition to bread, beef-tea, potatoes, and gravy.

May 3rd.—The patient was very bright; her mother said she never remembered having seen her so well. She was smiling and taking notice of strangers, and the depression which attended the rapid emaciation produced by the thyroid feeding was beginning to pass off.

Sudden Attack of Influenza.—On the afternoon of *May 3rd*, one hour after tea—which consisted of biscuit and milk—the patient was suddenly seized with vomiting, followed by profound collapse. The nurse thought she was dying, and, as she knew that I took a special interest in the case, I was hurriedly sent for. When I saw the patient at 7 P.M. she was looking very ill, moaning continuously, and kicking her legs about as if from pain in the abdomen. The skin was hot, temperature 102°, pulse 140. On questioning the mother, I found that the patient had taken a very hearty dinner, consisting of gravy, potatoes, and beef-tea—her usual dinner food. She had also taken a hearty tea of milk and biscuits. The milk was quite sweet, and she had had the same biscuits before. The attack did not appear to be due to anything that the patient had eaten. I thought it probable that the symptoms were due to a commencing attack of influenza, and the subsequent course of events showed that this was the true explanation of the matter. A typical case of influenza had been admitted into the ward a few days previously, and had been put into a bed next the fireplace, near to which the patient and her mother were in the habit

of spending most of the day. When I saw the child at 7 P.M. I at once gave her a teaspoonful of brandy and one drop of liquor morphiæ. The nurse was instructed to repeat the dose from time to time if the pain and collapse continued, and to apply warm fomentations to the abdomen. At 11 P.M. the patient was better. Through the night the temperature rose to 103°·8.

On the morning of *May 4th* the temperature was 102°·2. The child was still looking ill, but distinctly better. She was free from pain; her tongue was dry, and she was very thirsty. Half a grain of quinine was ordered every four hours.

May 5th.—The temperature rose last night to 104°·2. This morning it is 100°·8, and the pulse 136. The child looks much better. The quinine to be continued in larger (one-grain) doses.

May 7th.—The patient has not slept a wink for forty-eight hours. Last night she groaned and grunted continuously; but she looks better this morning, and is taking a large quantity of milk. To have ten drops of bromidia at 6 P.M., and a second dose at 10 P.M., if she does not sleep.

May 8th.—The patient had a very good night after the bromidia. She looks better.

May 9th.—The patient looks bright, and almost as well as she did before the attack of influenza. She took two pints of milk yesterday. The thyroid feeding, which has been discontinued since *May 3rd*, to be again commenced in the same dose as before—5-drop doses of Brady & Martin's extract once daily. To go on with the brandy (half a teaspoonful three or four times a-day).

After-History of the Case.—May 10th.—The skin is peeling freely from the hands and feet; the hair is beginning to grow. The anterior fontanelle is smaller and firmer than it was at the time of her admission. The child is bright. The blueness of the lips and tongue has almost entirely disappeared. She laughs when spoken to. Though her legs are very weak, she is able to stand leaning on a chair better than she has ever done before. The globulin which was present in the urine at the time of her admission to hospital has disappeared.

May 12th.—Still improving; is taking nearly three pints of milk daily.

May 15th.—The patient was stripped and exposed for a short time at the clinical lecture yesterday. An hour afterwards she became blue all over, and collapsed without any apparent cause. The blueness lasted for two hours, during which time she had two doses of brandy. After the collapse she became very hot; at 6 P.M. the temperature (taken by the nurse) was 106° F. Two grains of quinine were immediately administered; at 8 P.M. the temperature had fallen to 101°.

May 17th.—The temperature is normal, and the patient is bright, and seems in her usual state of health. At the urgent request of her mother she was allowed to go home to-day.

Condition after Treatment for Two Months.

On June 7th she was looking decidedly better and brighter, tongue smaller, expression more intelligent, and a crop of fine hairs was growing on the bald part of the head. She was stronger than at the time of her discharge from hospital, but her legs were still very soft and flabby; in fact, the legs and arms seemed to consist entirely of skin and bone; no muscle could be felt. A large molar tooth on each side of the lower jaw was pushing through the gum. The gums were swollen, inflamed, and suppurating. The hands were much smaller, and the palms less wrinkled than they used to be. The umbilical hernia was not nearly so large. The skin was smooth and soft. The patient had been taking five

drops of Brady & Martin's extract every other day since the discharge from hospital. She now measured 32 inches in length; in other words, she had grown two and a half inches since her thyroid treatment had been commenced. She was ordered to take one tabloid of Burroughs, Wellcome, & Co.'s extract of thyroid instead of the liquid preparation (5 minims of Brady & Martin's extract) every other day.

Condition after Six Months' Treatment.

I visited the patient on November 15th, and was greatly struck with her altered appearance. She looks much bigger and older than she did three months ago. Before the thyroid treatment was commenced she did not look more than two or two and a half years of age; she now looks at least four or five. She has grown 6½ inches since April 1st; she now measures 36 inches in length. The curvature of the spinal column is much more apparent than it was before. Both her father and mother say that she is much brighter and more intelligent. She says "Da-da" and "Ma-ma," claps her hands in imitation of her sister, and seems to understand some things that are said to her. The anterior fontanelle is much smaller than it used to be, and very firm; it is evidently being filled in with bone. The hair has grown over the bald part of the scalp; the eyebrows are also much thicker, stronger, and longer. She has got four new teeth; the legs are firmer, but still very soft. The patient is able to support herself on her legs much better than she used to do, but she is still unable to stand erect even with support.

In some respects the patient does not seem so well as she was at the end of July. The skin is more dry and harsh, the tongue is larger, and the supra-clavicular swellings are more marked. The dose of thyroid was consequently increased from one to one and a half tabloids every other day. I would have ordered a larger dose had I been certain that the mother would have given it to the patient, but she was so impressed with the profound depression and emaciation which were produced by the larger doses which were given in the hospital, that it was with difficulty she could be persuaded to increase the dose at all. The patient is taking plenty of milk, is sleeping well, and is, her mother says, quite contented and happy. The gums are, as they have been all along, much thickened and inflamed, and there are numerous abscesses at the roots of the old stumps. The mother had been previously advised to have the stumps extracted. This was again insisted upon. Since I saw the patient in July, she has spent a month in the country. Her mother states that she sweated profusely during the hot weather.

Summary of the Effects of Treatment.

From the account which has just been given it will be seen that

the thyroid feeding very rapidly produced a marked change in the condition of the patient. The œdematous infiltration of the tissues rapidly subsided, and in the course of a few weeks entirely disappeared. In the course of a single week the swelling of the lips, tongue, and body generally had decreased considerably (see Table of Measurements). At the end of six weeks the skin had become soft and smooth, peeling being in this, as in the other cases which I have closely observed, well marked.

In the course of six months the patient has grown $6\frac{1}{2}$ inches (equal to one-fifth of her total length before treatment), and she looks at least two years older than she did before the treatment was commenced. She is certainly more lively and intelligent looking. The open fontanelle is filling rapidly up. The hair has grown over the bald area of the scalp.

The following Table of Measurements shows the alterations in the length and size of the body which have taken place as the result of the treatment.

I hope to report the further effects of the treatment in this very remarkable case at some future date.

Table of Measurements, showing the results of Thyroid Feeding.

	April 3rd.	April 8th.	June 7th.	Nov. 15th.
Length	29½ in.	29¾ in.*	32 in.	36 in.
Breadth of mouth	6 cms.	5 cms.	5 cms.	4½ cms.
Mouth from above downwards	5 „	3½ „	3½ „	3 „
Thickness of upper lip ...	1⅛ „	1 „	1 „	1 „
Thickness of lower lip ...	1⅛ „	1 „	1 „	1 „
Circumference of neck above swelling	34 „	29 „	25 „	30 „
Circumference of neck over swelling	37 „	32 „	26 „	34 „
Circumference of head ...	51½ „	51½ „	50 „	51 „
„ „ abdomen...	21¾ in.	20 in.	18 in.	18½ in.
„ „ thorax ...	22 „	21½ „	21 „	21½ „
„ „ thigh ...	26 cms.	26 cms.	19½ cms.	24 cms.
„ „ calf ...	18½ „	17 „	14½ „	16½ „
„ „ arm ...	17 „	14 „	12 „	14 „
„ „ forearm ...	18 „	16¾ „	13 „	15 „
Length of foot	11½ „	11½ „	12½ „	13¾ „

Dr Ireland said it was a very striking fact that so many cases of this disease had occurred in one quarter in Edinburgh. It would be of great importance to ascertain the cause of its having this endemic character. He was at present trying treatment by thyroid gland in the case of a Mongolian idiot. Some improvement had

* The increase of a quarter of an inch was probably due to the increased extension of the limbs (the result of diminished œdema) rather than to an actual increase in the length of the body.

resulted, but he hesitated to say that it was greater than would have occurred under the usual methods of treatment. He was disappointed that there had not been more improvement in the mental condition in Dr Bramwell's case. It was probably accounted for by the fact that the child had reached an age at which the brain might be expected to have closed its development.

Dr Robert Mackenzie asked whether this condition of cretinism was due to diminution or loss of function of the thyroid?

Dr Taylor, referring to the statement that cretinism and myxœdema were specially prevalent in a particular locality in Edinburgh, said that in making inquiry into the matter it was to be remembered that there were several different supplies of water for the town, that there were different degrees of humidity in different districts, that in certain places there had formerly been lochs, and that in some localities diseases of a remittent type had at one time been prevalent. He asked Dr Bramwell to tell them to what part of the town he referred, as the more observers there were the sooner would the cause be discovered.

Dr Guy, referring to the changes in the jaws which Dr Bramwell had described, said it would be of great interest to know whether or not the permanent incisors showed any signs of coming through. If they did, it would show that an extraordinary access of development had taken place in one respect at any rate. He suggested that attention should be given in such cases to the form of the palate and its changes under treatment.

Dr Robert Mackenzie asked if the statement which had been made was true that in sporadic cretinism fatty tumours occurred, while in the endemic form they were absent?

The President said they were all very much indebted to Dr Bramwell for his ably worked out paper. He could not help being struck with the intense maternal affection in this case,—probably one of the intensest of which they had any record. It was one of those things without which Nature could not go on. During thyroid treatment, and perhaps for some time afterwards, it was necessary to be exceedingly careful. Both the breathing and the heart centres were then extremely liable to be inhibited by very slight causes indeed. He had had a case of myxœdema in which the brain was specially affected, as shown by a severe attack of mental disease. Under thyroid treatment the patient made a perfect recovery. On the Saturday night after her return home she and her friends had a big drink and supper, and on the Sunday morning she took an enormous breakfast. The result was she died in the course of the day.

Dr Bramwell, in reply, said he agreed with the President in thinking that great caution was necessary in carrying out the thyroid treatment in cases of myxœdema and sporadic cretinism. In these diseases rapid emaciation and great cardiac debility were often produced, especially if the dose was excessive, or if the

patients were old and debilitated. It was for this reason that he usually kept his myxœdematous patients in bed during the earlier stages of the treatment. He agreed with Dr Ireland in thinking that the reason why no marked improvement had as yet occurred in the mental condition of this patient was owing to the age of the child. The case was, it must be remembered, a very severe one,—in fact, the most aggravated case of sporadic cretinism which he had ever seen or which he had found recorded in medical literature. In such a case it could hardly, perhaps, be expected that very marked or rapid improvement in the mental condition would take place. The patient was to all intents and purposes an infant (though 16¾ years old). She was not only an infant, but an idiot. The degree of mental development which is produced in a healthy infant in the course of six months is not, after all, very great. It was unreasonable to expect, in the course of six months, a greater amount of mental development in this case than would take place in a healthy infant in six months. Probably that amount of mental development had actually taken place. The cases of sporadic cretinism in which the improvement was most marked and rapid were those in which the patients were young, or in which, notwithstanding the presence of the disease, a certain amount of brain development had already taken place. He had at the present time under treatment a child 3 years old, who had manifested the first symptoms of the disease when it was a year old. Before treatment, it looked like a baby of eight or nine months; it had no teeth; the anterior fontanelle was widely open, and all the characteristic symptoms of the disease were present. After a few months of treatment, an enormous improvement had taken place. The fontanelle was now almost closed; the umbilical hernia had entirely disappeared; the child had got all its first set of teeth; it was mentally much more lively and active; it now looked like a healthy child of two years old; it was creeping about actively, but it could not yet stand or speak. In reply to Dr Mackenzie's questions, he said that it was now admitted that sporadic cretinism was due to arrested or defective secretion of the thyroid gland. In some cases of sporadic cretinism the gland was perhaps congenitally absent; in others, its development had become arrested, or the gland diseased in early life. He could not answer Dr Mackenzie's second question from his own personal knowledge. In well-marked cases of sporadic cretinism, pseudo-lipomata were, so far as he knew, always present. His experience of endemic cretinism was not sufficient to allow him to say whether pseudo-lipomata were always absent in cases of endemic cretinism, but it had been stated that that was the case. As Dr Mackenzie had said, it had been suggested that the absence of pseudo-lipomata was a distinctive feature of endemic, as distinct from the sporadic form of the disease. In reply to Dr Guy, he said that in this case the palate was very broad and deep, the very

reverse of a V-shaped palate. The gums were so swollen and inflamed that it was difficult to be sure about the condition of the incisor teeth. He would, however, examine the point more carefully when he next saw the child. He was interested to hear of Dr Ireland's case of Mongolian idiocy; for through the kindness of Dr John Thomson he had recently had an opportunity of seeing a typical Mongolian idiot, which had grown and improved considerably after a few weeks of thyroid treatment. So far as his experience went, bad effects from the treatment chiefly occurred in cases of myxœdema and sporadic cretinism. Healthy persons could usually take large doses of the drug (equivalent to half a gland daily) without bad effects; but there were no doubt idiosyncrasies in this respect. Some people were certainly much more susceptible to the action of the drug than others. He had merely mentioned the circumstance of the possible endemic distribution of the disease in a certain part of Edinburgh incidentally. The locality to which he referred was Glenogle Road, the rows of houses running off from it, and the surrounding district. So far as he could see, the endemic distribution of the disease (if it was more than an accidental circumstance) could not be accounted for by any peculiarity in the water-supply. He agreed with Dr Ireland in thinking that it would be an exceedingly difficult matter to determine why the disease was more prevalent in one part of the city than in another. It might, of course, be that further information would show that this apparent prevalence was merely accidental, or that it was not a fact; but Dr John Thomson and himself had been so much impressed with the facts he had mentioned that they were anxious to try and arrive at a definite conclusion on the point. They would be very much obliged to any Members of the Society who would give them information which would enable them to settle the matter.

2. ON A SELF-INFLICTED BULLET WOUND OF THE HEAD; EXTENSIVE INJURY TO SKULL AND BRAIN; RECOVERY.

By Allen Thomson Sloan, M.D., C.M.

A. B. C., aged 38, foreman gunsmith, a highly intelligent, steady-living, exemplary man, had been suffering for some months, probably five or six, from mental depression, the result of over-work and anxiety, due to the long and painful illness of an only sister and the very sudden death of a brother who was living abroad. He first consulted me for his present illness in the beginning of the year, complaining chiefly of indigestion associated with constipation, which rendered him slightly irritable and not quite so able for his work. Some simple treatment was prescribed, which evidently had the effect of curing him, as he did not again call on

me till March the 30th, when his general appearance and symptoms were such that I advised him immediately to give up his employment and take a trip to America. He complained of a rushing, oppressive feeling on the top of his head, and felt his work a perfect burden to him,—so much so, that he was afraid to awake in the morning for the thought of what lay before him that day. When away from his work, even for a day, these feelings were entirely removed, and he felt quite cheerful and like himself. Knowing his family history I urged him not to delay, but to take out his passage the following week, told him that nothing else but a complete change would be of any benefit, got his mother, who already had her fears aroused, to do all in her power to persuade him, but could only get his consent to go away to the country for a few weeks. This he did, with the result that whilst there he was apparently in perfect health, but the moment he resumed work there was the old complaint of the great feeling of oppression on the top of the head, and a general aspect of depression, which showed itself in his hanging head and altered, downcast gait as he walked through the streets. I saw him as a patient again on April 14th, and prescribed some acid tonic with liq. strychnine, advised him to get assistance in his business, and gave him 30 grs. of bromide of potassium to be taken at night to induce sleep. I met him accidentally about the beginning of June, and again finally pled with him to go abroad, but only with the effect of increasing his obstinacy, for he flatly informed me he would *not* go.

On Sunday morning, June 11th, about 8 A.M., two hurried messages arrived to go at once to the patient's house; and as the second of these indicated what had happened, I sent a messenger in a cab to Prof. Annandale, so that we almost arrived simultaneously. His mother, the only responsible person in the house, informed us that it was his usual custom to rise early on a Sunday morning and go over to his garden, and then return to breakfast. Being a little later than usual, she knocked at his door to inquire how he was, but was informed that he only wanted to be left alone. A minute or two after she heard a report, and entering the room found her son lying stretched out on bed with a smoking revolver in his hand, and a hole in his forehead, from which a tremendous amount of blood was rapidly flowing. With extraordinary presence of mind she removed the weapon and bound up the head with a pledget of cotton wool and a bandage, and sent first for a friend and then for medical assistance. Before this gentleman arrived, without any aid twice did the patient walk to the bath-room, lock the door, and attend to himself; and when the revolver was lifted, cried out to his friend, "For God's sake, man, be careful that no one is hurt, for it is loaded." The day previously he had been at his work as usual, had attended to the payment of the men under him, and on the afternoon went a drive into the country with some

friends, when he seemed perfectly happy and in his ordinary health and spirits. In every one's opinion he was the last person in the world to associate with suicide; and except for a growing irritability in temper, was the sanest man in the world, with no delusions whatever other than that his work was too heavy for him.

We found him in a state of considerable collapse, hands and body cold, face deadly pale, pulse extremely slow, but of fair volume, and with, for the size of the bullet, a very large entrance wound exactly in the centre of the forehead. There was no visible blackening of the skin, singeing of hair, or burning of the edges of the wound with the powder. The scalp was torn quadrilaterally, and the edges, 1¼ inch long, inverted; and there was most extensive fracture and comminution of bone. Blood was also issuing from the mouth and nose, indicating some injury extending to the base of the brain, and altogether the case seemed a perfectly hopeless one. Nevertheless chloroform was administered, under which the patient struggled violently and moaned loudly, and Mr Annandale proceeded to remove the bullet. Six pieces of loose bone were removed with dressing forceps, and the interior of the brain was explored by the finger. What was thought to be a piece of bone, but was really the bullet, flattened like a button, was found lying on the cribriform plate of the ethmoid and removed, and a longitudinal fracture of the ethmoid discovered. One portion of the bone was blackened, and another piece, distinctly felt, could not easily be reached, and so was left, as it seemed useless to trouble the patient further. The wound was dusted with boracic and iodoform powder, a pad of salicylic wool, fixed by a light gauze bandage, put over it, and the very gravest prognosis given to the mother, whose natural prayer under the circumstances was for speedy death.

Soon after we left, without assistance the patient again walked to the bath-room, snibbed the door, attended to himself, and returned to his bedroom, only to fall on his bed and remain in a quiet, semi-comatose condition for the rest of the day. The remarkable thing about this action, after such rough handling and treatment of the brain, was, that it was no sudden impulsive act, but deliberate, and hardly explainable as a mechanical act capable of performance without thought or reasoning. In the afternoon he was removed to a large room and placed in bed, with the head, which felt very heavy, lying far round to the left side, from which position it never moved for *twenty-two* days, except when forcibly lifted for the better dressing of the forehead. The whole of that day the patient neither moved nor spoke, and was unable to swallow anything whatever, owing to the swelling of the tongue and stiffness of the jaws. In the evening the only difference observable was extensive brawny swelling of the muscles of the right side of the neck, and commencing ecchymosis of the surrounding scalp, face, and eyelids.

The following morning, June 12th, the patient presented a ghastly spectacle. The edges of the wound were everted and swollen, and, impelled by the pulsating brain behind, at least a teacupful of blood-clot was slowly extruded. The eyelids were deeply ecchymosed, the conjunctivæ injected and full of extravasated blood; the lower palpebral conjunctivæ to such an extent as to completely evert the lower lids. The corneal surface was full of hæmorrhages, so that the pupils were with difficulty seen, and found to react to the stimulus of light. There was deep black-blue discoloration of the skin of the face, extending right over the surface of the malar bones, and over the nose down to the angles of the mouth. The sterno-mastoid on the right side was tense, red, glistening, and swollen, with here and there extravasations under the skin. The lips could be opened with difficulty, and the tip of the tongue only protruded. A little iced milk could be slowly swallowed after insertion between the teeth with a teaspoon. By gentle palpation round the margins of the wound numerous crepitations could be produced by the rubbing together of the comminuted portions of bone. The patient was perfectly conscious, was able to make use of a urine-glass when necessary; tried, when asked, to put out the tongue; could move feebly right or left hand, or individual fingers of these, at will, as also right or left leg and toes; was sensitive to heat and pain, had no paralyses, and indicated that he had no violent pain of any kind, though he moaned loudly on any attempt being made to move the head, which hung heavily helpless towards the left side, as previously described. During the whole of that day the patient lay absolutely still, made no effort to make signs or speak, swallowed very slowly, and with great apparent pain and difficulty, very small pieces of ice or teaspoonfuls of iced milk, but was able to comprehend what was said to him, used the urine-glass after some delay at stated intervals, and altogether seemed quite unaffected as regards comprehension or intelligence. The pulse, which in the morning had risen to nearly the normal rate, was 82 per minute; and the temperature, which throughout the day had been slowly rising, was 100°·6. The urine, carefully tested, contained no sugar nor albumen, and was in every other respect perfectly normal. A male attendant was procured for him; and when with his assistance the dressing was removed at 9 P.M., the wadding was found to be thickly covered with pure brain substance, and at least a tablespoonful, both grey and white, unmixed with blood, oozed slowly from the wound, as if pushed gently out by the pulsating brain behind. The fixing of the bandage was by no means easy, as the patient was totally unable to raise his head, and groaned loudly when the slightest movement was attempted, and indicated that the greatest pain felt was in the muscles of the right side of the neck and behind the left ear, which lay in closest contact with the pillow.

From that date, for the next three weeks two-hourly observations

were nightly made as regards temperature and pulse, and after the first week in regard to respirations, while similar observations were made each four hours through the day, and any alteration recorded in the temperature charts which I now produce.

On Tuesday, the 13th, at the morning dressing, at least another tablespoonful of brain matter was lost on the wadding, or was slowly extruded, while the temperature had continued gradually to rise to 102°·4, with corresponding quickening of pulse. An enema was administered, with the object of which the patient was fully conscious, and which without any difficulty he easily retained, and with the attendant's help was able to make use of the bed-pan for a very effectual and natural motion of the bowels.

The tongue could only be shown with great difficulty, was thickly furred, flabby, and swollen, but speech was comparatively easy, and the seat of the pain localized, and great complaints made as to our rough handling of his head. The chief pain complained of was in the whole head when it was actually raised, but most intense in the muscles of the right side of the neck, the skin over which looked angry, red, and glistening, the tension, owing to their strained position, being very great. Liquid nourishment, chiefly iced milk, was now much more freely taken, though the act of swallowing was slow, and attended with a considerable degree of actual pain.

At 4 P.M. the patient was again visited by Prof. Annandale, in whose presence the dressing was removed, with the same attendant loss of at least a dessert-spoonful of pure brain matter, a further quantity of which could easily be squeezed out by simple pressure on the numerous crepitating portions of comminuted bone, which formed a complete circle round the gaping wound in the scalp. He did not immediately recognise Mr Annandale, who was well known to him, but on being told who it was, immediately said, "Is that the Professor? I hope you are quite well, sir." I may mention that from the day following the accident till his removal, three weeks after, he not only perfectly recognised me, but could tell my coming up the stair, and at the different hours of visitation used to lie and listen for the sound of carriage-wheels or of footsteps on the street.

From the patient's appearance, the rising temperature, the great loss of pure brain substance, and the fact that examination of the bone removed had revealed that the longitudinal sinus had been opened into, our prognosis was still very hopeless, as we thought it hardly possible the patient could recover without secondary meningitis, cerebritis, or septicæmia. So much so was this my own opinion, that daily some indication of a fatal termination was looked for, until, from the patient's absolutely perfect understanding of all that was required of him in the way of making an effort to take nourishment and otherwise helping himself, there arose the possibility of a more favourable issue. In the evening, at 11 P.M., the temperature rose

to 103°·8, but nevertheless the patient passed a quiet night, lying absolutely still, and only disturbed to be fed at intervals with iced milk, which he was able to sip very slowly from a drinking cup.

During the next twenty-four hours there was nothing special to note except a further loss of pure brain substance on the dressing, and a gradual but welcome fall in the temperature, which, however, on the evening of the 15th, the fifth after the accident, took a sudden rise to 104°·4, the highest degree reached during the whole course of the illness.

A powder containing 5 grs. each of calomel and rhubarb was given, and next morning the bowels acted very freely three times, the patient being fully able to indicate his wants to the attendant, and having absolutely complete control over his sphincters.

From the 15th to the 17th the temperature continued to fall; but on that day, in assisting to change his clothing, I observed a very marked and noticeable incident. In eight days, the patient, previously a well-nourished, healthy adult, had *wasted* to such an extent that it was thought advisable to put him on a water-bed; and on the lobe of the left ear, the one in constant contact with the pillow, a bed-sore ¼ of an inch in length had formed, and this in spite of its having been padded in the dressing of wadding and gauze. This is only explainable on the grounds that some very marked "trophic" influence had been at work. Further, this, the eighth day of the accident, was an important one, as for the first time since the wound was inflicted the patient suddenly asked, "Had the bullet been extracted," though no notice was taken of his question; and he groaned loudly as the ear was dressed, saying, "there was a hole there where the bullet had come out." Previously not the slightest reference had been made as to the cause of the injury, and I am quite satisfied in my own mind that the patient himself had no exact idea, though I learned from the attendants that on the third day he had fancied he had been in some railway accident, and asked if any others had been injured.

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In the evening the temperature rose to 103°, and next morning the respirations were noted to have become very shallow and rapid. With great difficulty the patient was raised and held in a sitting posture, one attendant specially holding the head, and extensive dulness of the base of the left lung was detected, with numerous crepitations all over it. Though the temperature kept high for the next four days, this condition was thought simply to be a hypostatic pneumonia, caused by the continued lying of the patient on the left side of the body.

During this week altogether at least four tablespoonfuls of pure brain matter had been expelled from the wound in the forehead, and a hole from an inch to an inch and a quarter deep was left, from which exuded from time to time a sero-sanguineous fluid. The uninjured brain was seen pulsating behind, the pulsations being conducted to the edges of the scalp wound, and affecting the

loose comminuted portions of bone around it. There was no attempt at fungoid formation. The portions of destroyed brain having been expelled, granulations at once began to form and fill up the gap from within. The patient's general condition was much improved; the mouth could be opened with more freedom, and very light semi-solid nourishment taken; the eyes, though still much injected, were fast regaining their normal white, and the ecchymosis, fading gradually from blue to yellow, was slowly diminishing in extent. The muscles of the right side still remained tense, swollen, and painful, and it was absolutely impossible to turn the patient's head.

Mentally the condition was unchanged, though two noticeable incidents happened: first, a cousin arrived unexpectedly from abroad, and with him he had a sustained and perfectly intelligent conversation in regard to the route he had travelled, how he had left his friends, and what were his business prospects; while a few days after—the tenth of the accident—his brother, who had been cabled for unknown to him, walked into his room. Strangely, his visit seemed to occasion no surprise; no reason for his coming was asked, but all the usual inquiries about the health of himself and family and other social details were naturally and sensibly alluded to.

On this day, the 21st of June, the temperature fell to 99°, and two days afterwards, the 23rd, to normal, but the respirations continued very rapid, varying from 26 to 32 per minute, though by this time the lung condition was rapidly clearing up. For the next two days the patient was kindly visited by my friend Dr Thin, and on my return from the country no particular change was noted other than an increased tendency to restlessness through the night, a desire to talk too much and sometimes incoherently, and a troublesome inclination to pull the dressing off his head and ear.

During the next week, though nourishment of all kinds was freely taken, and the wound was progressing rapidly and favourably, the edges of the scalp quickly uniting, and the portions of bone welding together, the mental condition got distinctly worse. There was confusion of ideas as to time and place. The patient fancied he was not in his own house, and cried out loudly to be taken there; kept constantly calling his attendant "doctor," and pled with him to take him home; got excited when contradicted; and constantly mistook the morning for the afternoon, and night for day. Finally, he became so unmanageable that it was thought advisable to remove him to Ward VI. in the Royal Infirmary, which was done in the ambulance waggon on the morning of July 4th, exactly twenty-three days after the accident.

By this date the patient's physical condition had greatly improved; the mouth could be quite freely opened, and solids easily swallowed; the ecchymosis had almost entirely disappeared from face and scalp, but there was still marked injection, especially of

the left eye, and discoloration of the eyelids. The wound was healthy, granulating, and filling up from below,—that in the scalp being almost three-parts healed. The most noticeable points in the patient's condition were the extreme emaciation, now rapidly improving, and the profound anæmia, due directly to the extreme loss of blood at the time of the injury. Some idea of the extent of this may be very roughly given by the mother's statement, that it took a woman washing one whole day to remove the stains from the floor, clothes, and bedding.

During his twenty-five days' residence in Ward VI. the patient's bodily condition continuously improved, but the mental condition became steadily worse; especially so after a second administration of chloroform a week after admission, on July 11th, on which day Mr Annandale removed the loose portion of bone previously left, and after which the wound still more rapidly healed. On being visited, he used to invite me to dinner, fancied my hat was a bag containing his clothes, had delusions as to having been out a walk in the country, and became so unruly in interfering with his dressings that on various occasions his hands had to be strapped down. Still at intervals he was perfectly intelligent, knew where he was, talked sensibly to his brother, inquired about those at home, and, especially towards the end of the month, showed marked increased mental stability and improvement. The risk of his returning home was so great that it was thought wise to send him to an asylum, and he was removed as a private patient to Rosslynlee on the following certificates:—

LUNACY CERTIFICATES.

1. Facts indicating insanity observed by myself:—"Loss of memory concerning facts which have occurred within a short time of questioning; absurd answers to questions which have been put. Delusions concerning people and things spoken about. Violent attacks of mania, with desire to injure others."

2. Other facts (if any) indicating insanity communicated to me by others:—"Attempt to shoot himself" (Dr Sloan). "Thinking himself out walking when in bed" (Staff-nurse).

JAMES T. C. LAING,
July 28th, 1893. Royal Infirmary, Edinburgh.

1. Facts indicating insanity observed by myself:—"Imagining that he has been down to the shop, to Portobello, and other places, while he has been in the ward. Tearing the dressings from his head several times a day. Delusions regarding persons who have been to visit him. Great loss of memory. Perverted ideas as to the facts of his illness."

2. Other facts (if any) indicating insanity communicated to me by others:—"Delusions as to persons about him—thinking that

they are entirely different persons" (Staff-nurse). "Singing 'Onward, Christian soldiers' times without number through the night" (Staff-nurse). "Thinking himself in a theatre" (Male Attendant).

D. C. BREMNER, M.B., C.M.,
July 28th, 1893. Canaan Lane, Edinburgh.

The next day, July 29th, the patient walked, practically without assistance, from Ward VI. to a cab at the east door of the Infirmary, and became during the drive to the Asylum absolutely and perfectly sane. So much so was his brother, who was accompanying him, struck with the change that he almost turned and took him home, and only with the greatest reluctance handed him over to the care of Dr Mitchell. From that day till now not the slightest symptom of insanity has been detected, and the patient has been absolutely without the faintest delusion of any kind whatever.

To Dr Mitchell I am indebted for the following report during his residence in the Asylum:—

"A. B. C.—Admitted to Midlothian and Peebles Asylum 29th July 1893; aged 38; single; gunmaker. No previous attacks. Came from Ward VI., Royal Infirmary, Edinburgh.

"*History.*—Hereditary predisposition is present, the patient's father having been melancholic."

As this is most important in connexion with the case I shall now detail it in full. Patient was born two years after his father's first discharge from the Asylum, and he unfortunately was again in confinement in a few months, when patient was actually *in utero*. His form of insanity was melancholia, with delusions that he could not work or make enough to keep himself and family. He often threatened to take his own life, and on one occasion was supposed to have actually attempted that of his daughter with a razor. A paternal cousin, a young man aged 25, died from an over-dose of chloroform self-administered; while a female cousin, also on the paternal side, died mysteriously in England, her death supposed to be due to poison taken by herself. His paternal grandfather died of cancer of the liver, an uncle on the same side of cancer of the root of the tongue, and his only sister of recurrent epithelioma of the upper jaw. This history tends to strengthen the idea of a possible relation between cancer and insanity. The father is still alive, is about 77 years of age, but in poor health. The mother, aged 74, is alive and well.

His first and the later mental and bodily symptoms have already been detailed in the history of the case.

"*State on Admission: Mental.*—The essential feature was mental depression,—simple depression without apparent delusion of any sort. There was also some confusion of ideas, and there was a slight degree of mental enfeeblement and also of apathy. He sat

still in a heavy, listless, dejected attitude, but would look up now and then at his questioner in a semi-suspicious manner when replying to questions. His tone of voice was very low. When asked how it was that he had desired to shoot himself, he gave rather incoherent replies, but said he did not NOW wish to kill himself. When asked to describe how he held the revolver with which he made the attempt on his life, he said at first he did not remember about it, but a few minutes afterwards he made an attempt to demonstrate how he held the weapon and fired, but the demonstration was given in a confused, uncertain, hesitating manner, as if he did not clearly recollect how it was done. His memory seemed fair,—namely, he gave his age and also the date correctly. Any of the above symptoms are explainable, in my opinion, by the weak and anæmic condition of the body, and also disappointment at learning that he was to be confined for some time, though his brother in the kindest way possible had explained matters to him in the drive out.

"*Bodily: Nervous System.*—Common sensation, special senses, motor and reflex systems seemed normal.

"*Alimentary System.*—Tongue furred; appetite poor. Bowels tending to be constipated.

"*Circulatory System.*—He was very anæmic (due to loss of blood). Pulse small and weak, 80; cardiac action rather weak; other systems seem normal. Temperature, 98°·0 F.

"In the centre of the frontal bone is a deep depression, and a cicatrizing wound about ¾ of an inch in diameter over the depression.

"*Progress of Case: July 29th.*—Placed in No. 2 Male Ward.

"*July 30th.*—Is taking a fair amount of food, and sleeping pretty well.

"*August 5th.*—Has written a very connected letter to his employer. He seems a little more cheerful now than when admitted. Asks for books to read, saying he finds the life here rather monotonous.

"*August 12th.*—Visited by Dr Sloan and by friends. The visits seemed to have a very beneficial effect.

"*August 21st.*—Has been employed gardening for the last week, and he has improved very much in his bodily health. Seems to have made a lot of blood, and has got much stouter.

"*August 24th.*—Asked leave to go upstairs to the Asylum dance, and seemed to enjoy looking on. Did not dance the first evening, but did so on subsequent occasions.

"*September 24th.*—Has improved very much in his general health, having been out every day in the gardens for the last six weeks. He is smarter and quicker in his replies than he was at first, and he seems rather more cheerful on the whole; but it is noticed that he now seldom, if ever, looks his questioner in the face when replying, and his manner gives one the impression that he does not wish to enter into conversation.

"*October 20th.*—This morning, about 4 A.M., he seems to have had an epileptic fit. An intelligent patient who sleeps in the same room with Mr C. says that he leapt out of bed uttering a loud cry. When the attendant came into the room he found him in a state of muscular rigidity, and apparently in a state of tonic spasms. His bed was saturated with urine. When seen by reporter he was in his usual condition, and did not remember anything about having had an illness that morning.

"*October 23rd.*—Has been out for these two days past as usual. Has gained about a stone in weight since admission.

"*October 28th.*—Has remained very well indeed since last note. He looks, acts, and speaks like a sane man in all respects. He is now more cheerful than he has ever been since admission, and looks at his questioner much more readily than he has yet done. Was to-day discharged—*Recovered.*"

To further illustrate his very rapid return to complete mental health I shall read extracts from two letters received by me, and dated August 6th and 22nd respectively.

"*August 6th*, 1893.

"DEAR SIR,—When brought here my brother said that you would come out in a week to arrange for my getting home. Dr Mitchell has promised to let me go home with you. I shall be greatly obliged if you can come out soon, as I am wearying to get home again. I am comfortable here, but, of course, would prefer my freedom. I find myself gaining strength slowly, and my head is not so bad now, and I hope soon to be all right again."

It is to be noted that this letter was written within two months of the date of the accident (June 11th).

"*Rosslynlee Asylum*, 22/8/93.

"DEAR SIR,—I send you a few lines to let you know how I am keeping. I am glad to say that I am improving in health, and daily getting stronger. Dr Mitchell suggested to-day that I should write to you and see if you will agree to my leaving here. I would like to get away this week, and go to Callender 1st September, as I want to sail by the s.s. 'City of Rome,' on the 24th, for America. I am told that Dr Mitchell is going away his holidays very soon, and I would like very much to have this arranged before he leaves."

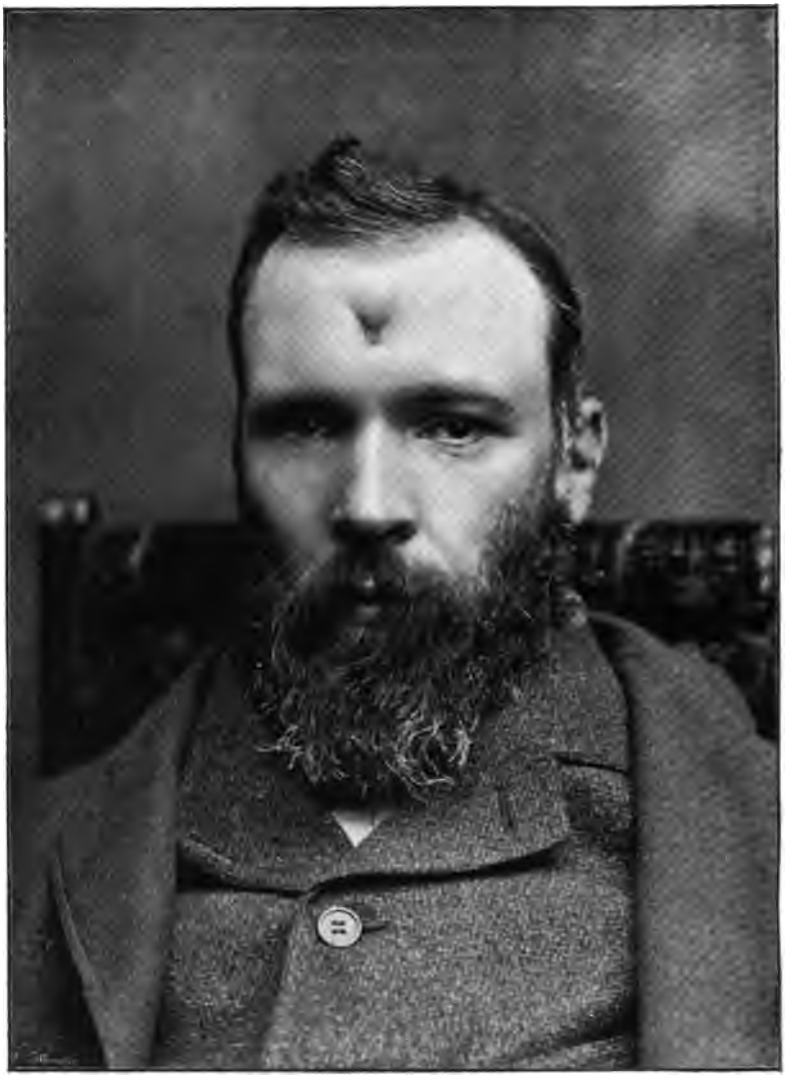
To me the most striking indication of return to perfect mental health was the extremely sensible and reasonable way he discussed this matter of residence in the Asylum; and when it was pointed out that complete recovery of mind was only consistent with improved bodily health, he at once consented to remain and complete the quarter. The marvellous improvement there made was undoubtedly largely due to his actually being constantly engaged in gardening work, of which recreation he was passionately fond.

October 29th.—The day after his discharge from the Asylum, after rather a sleepless night, owing to the excitement of his return home and a long conversation with his mother, who told him minutely about his illness and the various conversations he had

had quite sensibly with several of his friends from abroad who had visited him, of all of which he had not the slightest recollection, he immediately resumed his old ways of spending a Sunday. Rising in the morning he went over to his garden, from which I saw him returning with fearless alert step with a large bouquet of chrysanthemums, and proceed direct to a chemist's, to whom he was personally known, to ask for plaster, the better to hide the hole in his forehead. After breakfast he suggested it was time for him to dress to go to church, where a communion service was to be held; but was dissuaded from carrying out this intention by the good sense of his mother, who explained to him that there would be many children and others present, who, out of curiosity and not understanding, might make him the object of unpleasant observation. Easily convinced, after dinner he visited the cemetery to lay some flowers on his sister's grave, and went a long country walk to visit his father, from whom all information as regards the accident had been kept. He had tea there, and called for me on his return home, at my usual evening consulting hour, between 6 and 7. His appearance was immensely improved since the last time I saw him,—his cheek ruddy and healthy, the eye bright and full of intelligence. In fact, he looked better and in more perfect health than he has done for the last eighteen months. I asked him how the interview with his father had passed off, and he replied, "Very well," the only thing he asked being, "What was that on his forehead?" to which the reply was, "Oh, nothing; simply a piece of sticking-plaster." When asked how he had slept the night previously, he said, "Not well; not till four in the morning," owing to the excitement of meeting his mother and the details he had heard of his illness, all remembrance of which was to him an absolute blank. From what I had been informed of his drive in from the Asylum, I was aware he had a complete recollection of what took place the day previous to the shooting, and thinking him sufficiently well, I pressed him hard to discover if the act was a momentary impulse or had been premeditated. As he remembered going a drive down to Cockenzie, I asked him as to his actions previously and subsequently to his return. He seemed to flush a little, but quite frankly told me that that afternoon he took the revolver, which was lying in the shop, with the express purpose of using it; that the fact of his being invited the drive simply postponed the act—which he thought, however, had occurred on the Monday morning—finally determined on at the mere thought of returning to work which he felt quite unable for. On his return from Cockenzie he went early to bed, and lay awake all night, his uppermost thought being that if he could not get rid of this pain and feeling of worry he would go out of his mind, and rather than suffer this he determined to shoot himself. Asked if during the night he had no thought of his mother or friends, he said "Yes," but the main

idea was that of the continuous unpleasant sensations on the top of his head; and this he felt was the only possible means of putting an end to them. Further, he stated that on the Saturday it was deliberately he took the revolver,—the cartridges he had at home; that he was not in the habit of carrying such a weapon, and that no voices urged him, nor did any suggestion of any kind make such a desire enter his mind. As a fatal shooting case had occurred a few days previously, and had foolishly been fully reported in the papers, I inquired if his reading the report of it had been the means of making him think of it; but he at once stated he had neither heard nor read of it, and the only suggestion of means to employ lay in the fact that the weapons were constantly at hand in the way of business. He did not take the revolver to bed loaded, but it lay all night under his pillow, and it was only after having been spoken to by his mother that he suddenly rose and loaded it in two chambers, placed the muzzle in actual contact with his forehead, and fired. He said in doing so he was sitting on the edge of the bed, and must have fallen back when found by his mother. He distinctly recollects her cry at the report, but after that remembers nothing definitely till he wakened up in the Infirmary, though he has an indistinct recollection of being carried down stairs and conveyed away in a swinging bed in the ambulance waggon. Of his attendant Wilson, and of all other events,—such as being twice seen by Prof. Annandale and Dr Thin, of my frequent visits, the arrival of his cousin and brother from abroad, his perfectly connected inquiries about their friends and families, the route they had travelled, and the nature of their voyage,—he has absolutely no remembrance whatever. In Ward VI. he remembers occupying two different beds in opposite corners, but has no knowledge of being moved from one to the other; also the fact that his head was most frequently dressed by the nurse, and of his hands being strapped down by the male attendant Rae. He also states, which was perfectly correct, that on the latter going his holiday he was watched by a man Coutts, who treated him very kindly. Of Dr Gibson, who had charge of the ward, he has a perfect recollection, describing him as a tall, pleasant, clean-shaven gentleman, who used to nod and speak to him kindly, and with his close collar and manner exactly resembled a priest. He also was perfectly aware of at least four or five of my visits to him, and of his brother coming frequently there, and removing him to the Asylum, on which day his memory completely returned, and since then has been *absolutely perfect.* Of his residence in the Asylum he speaks warmly of the kindness of Dr Mitchell, but states he could never have been so well if he had been kept in the house and not allowed out constantly with the gardener, as the surroundings were depressing, and the other inmates not over-cheerful company. He told me about some of the patients: one especially, whose delusion was that another man

was inside of him and couldn't come out, and also of a poor professional brother, whose delusion was that he had had no food for eighteen years, and whose language when being fed was very coarse,—both of which cases really exist. About his going abroad he suggested waiting to go with a certain steamboat which was due to sail in about three weeks, as his father and brother had travelled with it; but I advised him strongly to go out at once and get clear away from all the old associations and surroundings; so he left me, intending to go to the shipping office the next forenoon, with the promise to call in and tell me if he had secured a berth. After conducting some banking business, in this he was successful, made every arrangement himself, and booked his own passage for the following Saturday. During the week he called on all his old friends, not forgetting the sick; re-visited his old shopmates, from whom and his master he received a handsome presentation; went to the Infirmary to thank the attendants for their kindness to him; and in every way acted in the thoughtful, kindly way he had been always accustomed to. The only fact that I could not really explain to my own mind was that he had apparently no sense of shame at his position, no hesitation in speaking about his case or his Asylum experiences, and did not feel the least embarrassed when asked by me if he would object to get his forehead photographed, or come and see Dr Littlejohn, who kindly showed great interest in the case. I explained to him that with the exception of the American crowbar case his was probably unique, and that I would like to publish it, to which he made no objection; and further, stated he knew all about that case, as he had read an account of it in the March number of *Harper* for 1885. The next day he went out to the Asylum to say good-bye, and brought me in the actual number referred to. So absolutely indifferent was he, that after much thought I am inclined to believe that, though apparently a symptom of a brain not quite sane, this total absence of sensitiveness is really a merciful indication of the completeness of the cure. The wound in the forehead was carefully examined by Dr Littlejohn and Dr Herbert Littlejohn, and also the day before he sailed (Nov. 4th) by Dr Thin and myself. As is shown in the Photograph, it is almost exactly in the centre of the forehead, where there now is a deep hole covered by an irregularly triangular cicatrix, the right side fully an inch and a quarter in length, the left about a quarter of an inch shorter. The bony deficiency is not well represented, for by union of the comminuted portions of bone a raised rim was formed round the depression, the whole being exactly covered by a crown-piece. The granulations must be very firm and fibrous, for, though partly protected by the narrowing of the bony canal at the inner table, the firmest pressure produced no symptoms whatever, other than slight pain in the cicatrix. The patient also has a scar on the lobe of the left ear, produced by the bed-sore previously referred to, and indicating



Dr A. T. Sloan s Case of Bullet Wound of the Head.

Dr A. T. Sloan's Case of Bullet Wound of the Head.

from its shape some actual loss of tissue. With the exception of marked diminution of the sense of smell, in every other respect—special senses, appearance, general health, and intelligence—patient is absolutely and perfectly well. He has no pain of any kind in any part of his head; there was no visible conducted pulsation except on the last occasion when he called to say good-bye, when he had walked quickly to my house and was much excited; and he himself expressed the opinion that all inclination for self-destruction had entirely disappeared, and that he was looking forward to a useful life across the sea.

The following letter, dated December 7th, six months almost to a day from the date of the injury, will further illustrate the completeness of the cure.

"*Georgia, U.S.*

"DEAR SIR,—I promised to write and let you know what kind of a voyage I had here, and should have done so before this time, but have put off till now. We had a fairly good voyage out. It was rough a little for some days, but not very bad. I was sick a little for four days, but after that was all right. We took ten days to cross the Atlantic, which is the time usually taken by the 'Anchoria.' She is a slow but steady ship, does not roll or pitch so much as some ships do. I did not stay long in New York, but took train for here, and came down by Washington, Philadelphia, Baltimore, and on down through Virginia and Tennessee into Atlanta, Georgia. From there by Columbus, M'Donnough, and Albany to Pelham, where my brother met me. I find this to be a pretty little town, or rather city they call it, but it is hardly worthy of the term city yet, but hope it will some day, as it is fast becoming a health resort for the wealthy Northerners to winter in. My brother has a fine large store in one of the best situations in town, and seems to be doing well, though every one is complaining of hard times,—cotton, which is the principal crop grown here, being very cheap at present, selling at less than it costs to make it. They have tried tobacco these last two years, but it is much too plentiful, and they cannot find a market for it. This is the land of flowers down here, roses and chrysanthemums in full bloom yet. The weather is quite cool now, barometer ranging from 70° during the day-time down to 30° during the night. I have stood the voyage and journey very well. My head does not give me any trouble, and I hope to keep right now."

My latest direct information was obtained no later than Sunday, the 17th December, in the form of an extract from an American paper, which I cannot refrain from quoting:—"Mr A. B. C., of Edinburgh, Scotland, arrived last night, and is the guest of Mr D. C., his brother. He will spend the winter here. Our readers will be glad to learn that Mr C. has almost entirely recovered from an accident which happened to him the first part of last summer, and which was at one time feared would result fatally. We trust his stay here will be both pleasant and beneficial."

The productions in the case are:—(1.) An ordinary six-chambered revolver, of Colt pattern, but inferior make. (2.) Seven pieces of fractured bone, removed by Prof. Annandale from the skull. (3.) Bullet flattened like a button and with inverted edges, removed from the brain. (4.) Empty discharged cartridge. (5.) Bullet weighing 80 grs., in cartridge containing 6 grs. of

powder, of quality No. 4 Cartis & Harvey; diameter of bullet, ·320. (6.) Photographs.

The chemical composition of powder was—Saltpetre, 75 per cent.; charcoal, 15 per cent.; sulphur, 10 per cent.

Experiments were made on wood, sheet-iron, and paper.

The experiments on wood were made with a view to showing the penetrating power of the bullet. The same revolver and similar cartridges were used. Finely-seasoned pine-wood, in blocks of ½ inch, 1 inch, 1½ inches, 1¾ inches, 2 inches, and 3 inches thick, was chosen. Through each of these fired *direct*, with the muzzle of the revolver 1 inch from the surface, the bullet went right through. Fired obliquely from above and below, the same result was obtained. All showed marked blackening, and even engraining of the wood with the powder, and the entrance hole was very small. In the 3-inch experiment the bullet in one instance was arrested when placed against a background of hard wood, and this seems to be the explanation of its not actually penetrating the skull. Passing through and shattering the hard outer table of the frontal bone at the level of the frontal sinus, the bullet was arrested by the inner table, which it penetrated, and simply dropped down on the cribriform plate of the ethmoid by its own weight. The experiment on sheet-iron produced a deep indentation, and in comparing the bullet with that removed from the brain there was hardly a distinguishable difference. The paper experiment showed beautifully the singeing and scattering of the powder, many of the grains of which went right through. The paper used was absorbent paper, not unlike blotting-paper. The important point medico-legally is, that there was *no blackening* of skin with the powder, and this I explain by the fact that the muzzle was actually bored into the forehead, with the result that the scalp was torn before the powder explosion took place, and hence the blackening of bone and absence of superficial burning of the edges of the wound. All the frontal convolutions must have been more or less injured, and it is important to specially note the marked *trophic* change occurring within one week after the accident.

March 11th, 1894.—Patient is bodily and mentally in perfect health, but had two epileptic fits after a severe attack of influenza.

Mr Hodsdon said they had to thank Dr Sloan for bringing before them this interesting case, which raised many points of great importance. Practically anything might be done to the brain in this region without interfering very much with consciousness. He mentioned two cases he had seen in which the frontal lobe was injured in children, and in which there were no mental symptoms then or afterwards.

Dr Sloan, in reply to questions, stated that there had been excitement in his case, but it was of very short duration. Though the revolver had been discharged so close to the head, there was

no singeing and no blackening. It was loaded with ordinary black powder.

Dr Byrom Bramwell remarked that we ought to be very careful in saying that there were no mental symptoms in such a case. There were certainly often no great mental symptoms, but the patient's mental disposition was often afterwards altered. He referred to the celebrated American crowbar case, an account of which was given in Professor Ferrier's book. In that case the man's whole disposition had been changed afterwards. Except in young people, an extensive injury to the frontal lobes was attended by some fine alteration in the mental condition, which, if carefully looked for, would always be found.

Dr P. A. Young mentioned a case of a similar kind of which he had recently heard. A patient in an asylum was struck on the head by another patient with a coal-axe, and the whole of the frontal region of the skull was driven into his brain. The case seemed a hopeless one, but the fragments were carefully removed, and the patient not only recovered from the acccident without a bad symptom, but was afterwards perfectly sane.

Dr Ireland said that in such cases one of two things should be expected,—either mental derangement or diminution of mental power. He thought that, as a general rule in such cases, the patients became weakened in mind. The power of attention and of grasping hard problems, and the power of moral control, were injured.

Dr A. Lockhart Gillespie said that the absence of blackening could be explained by the fact that the revolver was held so close to the skin. The part that was blackened would either be destroyed or pushed through the wound.

Dr William Russell asked Dr Sloan why he thought that the longitudinal sinus was injured? It was almost impossible to believe that this could have been so without very profuse hæmorrhage resulting.

The President, in thanking Dr Sloan for his paper, said that it was an extraordinary fact that cut-throat wounds, smashes on the head, and injuries to the brain did often result in the cure of insanity. He mentioned the case of a young man who suffered from suicidal melancholia. The case was a very bad one, the patient scheming in every possible way to put an end to himself. At last he succeeded in throwing himself over a window a height of about 30 feet. He came down on his face, and injured himself most severely. The result to his mental condition was that from that day onwards he began to recover. He thought that such a paper as Dr Sloan's indicated that in cases involving the determination of important medico-legal points, instead of having a number of medical witnesses pitted against each other, it would be better to have a medical commission appointed to investigate the matter and give in a report. He was sure that it would be an

enormous improvement in the administration of justice in cases touching upon his own department.

Dr Sloan, in replying, said that in support of his statement that the longitudinal sinus was opened into, he had the statement of Prof. Annandale, who examined the bone, and there had undoubtedly been a great loss of blood from the wound. He was of opinion that the patient had made a perfect recovery, and that now (six months after the accident) he showed no mental symptoms whatever.

3. *Dr Dawson Turner* exhibited APPARATUS FOR STATIC ELECTRICITY, including a Wimshurst machine, an insulating stool, electrodes, etc.

Referring to Mons. d'Arsonval's experiments, he said that the static charge increased the respiratory blood changes and the metabolism of the body in the case of healthy people; in cases of disease it also acted as a sedative, patients sleeping better after it; it produced generally a tonic effect. The electrical breeze or souffle has a local cooling and anodyne effect; it will often relieve a headache or attack of neuralgia. In effect, then, it somewhat resembles the anode of a galvanic current. If sparks be drawn, a decidedly stimulating effect is produced, one that is both local and general. The method of using the apparatus, and a means of recognising the poles of the machine, was also explained. Static electricity was generally indicated in depressed conditions of the system, in atonic dyspepsia, neurasthenia, and in those recovering from lowering diseases, *e.g.*, influenza; also in insomnia and chorea. Locally static electricity was of service in paralysis and in anæsthesia (sparks drawn from the affected part), constipation (sparks drawn from the abdomen, and particularly from over the sigmoid flexure), amenorrhœa (sparks drawn from the ovarian region). Static electricity possessed advantages and disadvantages: thus it could be administered immediately, the patient had not to remove any clothing, nor had the electrodes to be moistened; its effect could be graduated and carefully watched, and unless employed in unsuitable cases it could scarcely do any harm. On the other hand, an assistant was required to work the machine, and the apparatus was not portable.

Another method of using static electricity has been described by Dr Morton, who terms it the interrupted and induced static current. This method was also explained. Muscular contractions are very easily induced, and with less pain than with the current from an induction coil. Dr Morton also claims that this current has a truly analgesic effect. In sciatica the pain often disappears instantaneously. This action may perhaps be due to the extreme rapidity of the alternation. No other form of electricity, in Dr Turner's opinion, can approach this as a stimulus to muscle and nerve.

Several members submitted themselves to the action of the instrument which he exhibited.

Dr Dawson Turner, in replying to some questions, said that he thought from this instrument they could get the most perfect electrical stimulus they had, because the shocks were so instantaneous. It far surpassed the galvanic or faradic current as a nerve stimulant. There was no danger of the patient becoming overcharged, as he became brimful at once, and the electricity was then discharged.

Meeting IV.—January 17, 1894.

Dr Clouston, *President, in the Chair.*

I. Election of Members.

The following gentlemen were elected Ordinary Members of the Society:—William Simmers, M.B., C.M., Denburn, Crail, Fife; Charles A. Sturrock, M.B., F.R.C.S.E., 15 Regent Terrace, Edinburgh; James Mackenzie, M.D., 66 Bank Parade, Burnley; F. Maurice Graham, L.R.C.P. & S.E., Cowgate Dispensary, Edinburgh.

II. Exhibition of Patients.

1. *Dr Byrom Bramwell* showed—(*a.*) Two cases of LUPUS and a case of PSORIASIS, under treatment with thyroid extract, which had been shown at the last meeting of the Society; (*b.*) A remarkable case of ICHTHYOSIS, and Drawings of a second case.

2. *Dr W. Stewart* showed a case of COMPOUND SUBASTRAGALOID DISLOCATION OF THE FOOT.—T. W., æt. 24, seaman, who at 5 o'clock on the morning of the 18th November 1893 had dropped 25 feet into the hold of a ship in the Roads, landing with the weight of the body on the left foot. On his admission to the Leith Hospital, about 10 o'clock, the left astragalus was found dislocated downwards, inwards, and forwards, and protruding through a wound about 3 inches long, the foot being extremely everted. The anterior and posterior facets in the inferior surface of the astragalus were exposed, the interosseous ligament completely torn through, and the anterior part of the astragalus was fissured longitudinally. The posterior tibial vessels were lying for the space of over an inch quite free from any surrounding tissue, so that the finger could be easily hooked round them. They were, however, uninjured. On examination under chloroform

merly he would never willingly go into any house except his o home.

May 28.—Face still improving. His nose is becoming a better shape—the bridge apparently rising, and the alæ coming less broad. His friends say that they now see in h a likeness to one of his relatives which they never noticed bef During the last fortnight the left lower permanent molar appeared.

June 23.—The patient is still gaining in good looks and in int ligence, and also very steadily in strength and firmness of lim There has been no growth in height for three months. To increa the dose to a quarter of a thyroid twice a week.

July 17.—Photographed. (See Plate III.)

July 31.—Height, 37 inches. Improving generally.

Sept. 23.—His sister, who is a teacher, has been trying f some time to teach him to count, but so far without the lea success. One evening recently, being left alone, he took off all h clothes himself and went to bed, a thing which he had never don before. Height, 37⅜ inches.

Oct. 21.—Improving greatly in appearance; limbs becoming thicker and more muscular, thorax larger, and abdomen less Appetite very good. Still a good deal of bronchial wheezing. Dentition progressing; he has now four molars and one bicuspid of the second set. The upper central temporary incisors are getting loose. Height, 37⅝ inches. Ordered three-eighths of a thyroid twice a week.

Nov. 21.—Growing markedly in weight from increase in fat and muscle. He is very docile and good-tempered, and is beginning to recognise a few of the letters of the alphabet. Ordered half a thyroid twice a week.

Dec. 16.—He is still steadily improving in every way, and has not had the slightest discomfort from the increase of dose. He has now eight permanent teeth, and measures 37⅞ inches in height. His mother says that now he is almost never still, and that when she is occupied with household work he takes a lively interest in everything she does, and always wants to fetch or hold things for her, or do anything he can to help her. He is also always smiling and happy. Before treatment he used to sit still and apathetic most of the day, paying scarcely any attention to her movements. He is never shy now, and talks freely in a childish way about his clothes, toys, etc. He is making no progress in learning to count, and very little in learning the alphabet.

Dec. 20.—Photographed. (See Plate IV.)

REMARKS.—The improvement, then, has continued and is still continuing steadily, although scarcely at the same rate as during the first two months.

The growth in height of the skeleton, which had been at a stand-

[illegible] would never [illegible] any house except his [illegible]

May 31.—Face still improving. His nose is becoming a better shape—the bridge apparently rising, and the alæ standing less apart. His friends say that they now see in a likeness to one of his relatives which they never noticed before. Cutting the last through the left lower permanent molar appeared.

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July 17.—Photographed. (See Plate III.)

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REMARKS.—The improvement [illegible] tinued and is still continuing steadily, although [illegible] ne rate as during the first two months.

The growth in height of [illegible] id been at a stand-

still for about fourteen years, and was started again by the thyroid treatment, has amounted in the year to 4⅜ inches. Its rate has varied considerably from time to time, according to the amount of thyroid given. For some months the dose was evidently not sufficient to cause much growth; but latterly, with larger doses, the height has again increased steadily. In estimating the growth, however, the effect on the stature of the rapid bending of the lower limbs must not be forgotten.

The form and expression of the face have gone on improving, and not only have the hair and skin become normal, and the fatty tumours and umbilical hernia disappeared, but the figure has grown more shapely, and the thorax, abdomen, and limbs have changed in size, so that they now bear a much more normal proportion to one another.

The voice has improved greatly and the abnormal snoring has altogether ceased. The temperature remains normal, and the chilliness, which was formerly such a marked feature, is no longer complained of.

During the first few months of treatment, the lessening of the morbid swelling left the limbs very thin and weak, and the appetite was poor. This muscular debility lasted for many months, but latterly (compare Plates III. and IV.), *pari passu* with the increase of mental energy and desire for exertion, there has been a considerable growth in the bulk and power of the muscles; and the appetite has been better than ever it was before.

The rapid appearance of the permanent teeth during treatment is of interest; but it is probably only partially due to the influence of the thyroid, as the writer has another cretin under observation, in whom the second dentition began also between eighteen and nineteen, although no thyroid had been given at that time.

The mental progress, if not so great as that of the body, is certainly very distinct. The lad is making no progress as yet with arithmetic, and very little in learning his letters, but he is now thinking and acting for himself in a way that he never did before.

His morbid shyness and dislike of strangers has given place to the unrestrained familiarity and talkativeness of a little child, and his habitual discomfort and torpor to a normal sense of well-being, and quite an average capacity for enjoying life. This latter change, as has been pointed out elsewhere,[1] constitutes one of the most important and striking of all the many phases of the improvement which follows the administration of the thyroid gland in this disease.

With regard to the mode of administration of the remedy and its dose, there are three points worthy of mention,—

[1] *Brit. Med. Journ.*, Sept. 23, 1893, p. 677.

Firstly, With the exception of the first two or three weeks, when too large a dose was given, the treatment has caused no inconvenience at all, and it has not been necessary to confine the patient to bed, or even to the house.

Secondly, It has been pointed out that it might be preferable, on theoretical grounds, to give the thyroid in small doses frequently, rather than in larger quantities at longer intervals. The foregoing case, however (as well as others which the writer has recently had under observation), seems to show that the full effect can be obtained, without any observable drawback, by giving it twice a week. When the raw gland is given, this is, of course, much more convenient.

Thirdly, It is interesting to note that the patient is now, without the slightest discomfort, taking the same dose (half a thyroid twice a week) that a year ago made him very ill, and that this dose, indeed, appears now to be necessary if the full amount of improvement is to be maintained. Presumably a further increase of dose may be needed from time to time.

IV. Exhibition of Specimens.

1. *Dr Herbert Littlejohn* showed SPECIMENS from two cases of suicide—(*a.*) A PHOTOGRAPH of the HEAD, and the REVOLVER from a case of suicidal pistol wound of the head. The *photograph* showed position and character of the wound. The *pistol* showed *cartridges* attached, four of which bore the mark of the hammer, indicating that the trigger had been pulled four times, the last of which had taken effect. Deceased, who was a native of America, and aged 49, had been in depressed spirits for some months, apparently the result of overwork. He used to say that he had done a great deal of evil, and was not fit to live. He had attempted his life on a previous occasion by stabbing himself in the chest, and attempting to sever his femoral artery with a penknife. On the 4th August 1893 he was found lying on the floor of the water-closet in connexion with the apartments he occupied, in an unconscious state, and blood flowing from a wound on the right side of his head. He gradually sank, and died about one and a half hours after,—the immediate cause of death being asphyxia from blood passing down into the air-passages. At the post-mortem a wound about the size of a sixpence was found situated immediately in front of the pinna of the ear where it joins the scalp. It presented the usual appearances of a wound of entrance. There was no exit wound. On reflecting the scalp, both temporal muscles were seen to be infiltrated with blood. On removing the calvarium and examining the brain, the track of the bullet was easily seen passing transversely through the hemispheres and admitting the finger. At a point on the opposite side exactly corresponding to the wound, and lying immediately under the surface of the brain, the bullet,

flattened and distorted, was found. The arachnoid presented the appearance of opacity so often seen in cases of insanity. Various fractures were noticed. The main ones passed backwards into the occipital regions, forward through both orbital plates, and one passed transversely through the base, reaching as far as the temporal region on the left side. This latter fully accounted for the infiltration of the left temporal muscle, and for the blood passing into the air-passages.

(*b.*) The CALVARIUM of a young woman, showing injuries self-inflicted with a hatchet, which was also produced. Deceased was a domestic servant, and aged 23 years. About a fortnight prior to death deceased had suffered from influenza, after which she is stated to have been peculiar. On the morning of December 25th, 1893, her mistress told her she might have the forenoon as a holiday. The family went out, and she was left in the house with a fellow-servant, who, not seeing her, supposed she had gone out. About 2 o'clock her mistress returned, and her services being required she was sent for, but could not be found. The house was searched, and the bath-room door was found locked. This was forced, and in the bath, which was almost full of water, the girl was found lying on her side with her face covered by the water. In the room were found the hatchet and a bottle labelled laudanum. This bottle, which belonged to the master of the house, was known to contain about 1 oz. of laudanum. On post-mortem examination, extending from the roots of the hair in front, backwards for about 3½ inches, was a lacerated wound of about 1½ inch in breadth. The bone at the base of the wound was denuded of periosteum, and presented several longitudinal fractures, which apparently only involved the outer table of the skull. The usual post-mortem appearances of drowning were present, and the stomach contained what was evidently a dilute solution of laudanum (diluted by the water of the bath).

2. *Dr Alexander Bruce* showed a CHOLESTEATOMA.

V. ORIGINAL COMMUNICATIONS.

1. THE SIGNIFICANCE OF THE VENOUS PULSE.

By JAMES MACKENZIE, M.D., Honorary Medical Officer to the Victoria Hospital, Burnley.

THE tendency of the right heart to dilate and to permit a regurgitant stream of blood to flow back into the auricle during systole of the ventricle, when undue opposition is offered to the performance of its work, has long been recognised. The manifestation of this regurgitation has been found in the veins, chiefly in those at the root of the neck. This outward and visible sign of the dilated right heart may be associated with little or no other

enormous improvement in the administration of justice in cases touching upon his own department.

Dr Sloan, in replying, said that in support of his statement that the longitudinal sinus was opened into, he had the statement of Prof. Annandale, who examined the bone, and there had undoubtedly been a great loss of blood from the wound. He was of opinion that the patient had made a perfect recovery, and that now (six months after the accident) he showed no mental symptoms whatever.

3. *Dr Dawson Turner* exhibited APPARATUS FOR STATIC ELECTRICITY, including a Wimshurst machine, an insulating stool, electrodes, etc.

Referring to Mons. d'Arsonval's experiments, he said that the static charge increased the respiratory blood changes and the metabolism of the body in the case of healthy people; in cases of disease it also acted as a sedative, patients sleeping better after it; it produced generally a tonic effect. The electrical breeze or souffle has a local cooling and anodyne effect; it will often relieve a headache or attack of neuralgia. In effect, then, it somewhat resembles the anode of a galvanic current. If sparks be drawn, a decidedly stimulating effect is produced, one that is both local and general. The method of using the apparatus, and a means of recognising the poles of the machine, was also explained. Static electricity was generally indicated in depressed conditions of the system, in atonic dyspepsia, neurasthenia, and in those recovering from lowering diseases, *e.g.*, influenza; also in insomnia and chorea. Locally static electricity was of service in paralysis and in anæsthesia (sparks drawn from the affected part), constipation (sparks drawn from the abdomen, and particularly from over the sigmoid flexure), amenorrhœa (sparks drawn from the ovarian region). Static electricity possessed advantages and disadvantages: thus it could be administered immediately, the patient had not to remove any clothing, nor had the electrodes to be moistened; its effect could be graduated and carefully watched, and unless employed in unsuitable cases it could scarcely do any harm. On the other hand, an assistant was required to work the machine, and the apparatus was not portable.

Another method of using static electricity has been described by Dr Morton, who terms it the interrupted and induced static current. This method was also explained. Muscular contractions are very easily induced, and with less pain than with the current from an induction coil. Dr Morton also claims that this current has a truly analgesic effect. In sciatica the pain often disappears instantaneously. This action may perhaps be due to the extreme rapidity of the alternation. No other form of electricity, in Dr Turner's opinion, can approach this as a stimulus to muscle and nerve.

Several members submitted themselves to the action of the instrument which he exhibited.

Dr Dawson Turner, in replying to some questions, said that he thought from this instrument they could get the most perfect electrical stimulus they had, because the shocks were so instantaneous. It far surpassed the galvanic or faradic current as a nerve stimulant. There was no danger of the patient becoming overcharged, as he became brimful at once, and the electricity was then discharged.

Meeting IV.—January 17, 1894.

Dr CLOUSTON, *President, in the Chair.*

I. ELECTION OF MEMBERS.

The following gentlemen were elected Ordinary Members of the Society:—William Simmers, M.B., C.M., Denburn, Crail, Fife; Charles A. Sturrock, M.B., F.R.C.S.E., 15 Regent Terrace, Edinburgh; James Mackenzie, M.D., 66 Bank Parade, Burnley; F. Maurice Graham, L.R.C.P. & S.E., Cowgate Dispensary, Edinburgh.

II. EXHIBITION OF PATIENTS.

1. *Dr Byrom Bramwell* showed—(*a.*) Two cases of LUPUS and a case of PSORIASIS, under treatment with thyroid extract, which had been shown at the last meeting of the Society; (*b.*) A remarkable case of ICHTHYOSIS, and Drawings of a second case.

2. *Dr W. Stewart* showed a case of COMPOUND SUBASTRAGALOID DISLOCATION OF THE FOOT.—T. W., æt. 24, seaman, who at 5 o'clock on the morning of the 18th November 1893 had dropped 25 feet into the hold of a ship in the Roads, landing with the weight of the body on the left foot. On his admission to the Leith Hospital, about 10 o'clock, the left astragalus was found dislocated downwards, inwards, and forwards, and protruding through a wound about 3 inches long, the foot being extremely everted. The anterior and posterior facets in the inferior surface of the astragalus were exposed, the interosseous ligament completely torn through, and the anterior part of the astragalus was fissured longitudinally. The posterior tibial vessels were lying for the space of over an inch quite free from any surrounding tissue, so that the finger could be easily hooked round them. They were, however, uninjured. On examination under chloroform

still for about fourteen years, and was started again by the thyroid treatment, has amounted in the year to 4⅞ inches. Its rate has varied considerably from time to time, according to the amount of thyroid given. For some months the dose was evidently not sufficient to cause much growth; but latterly, with larger doses, the height has again increased steadily. In estimating the growth, however, the effect on the stature of the rapid bending of the lower limbs must not be forgotten.

The form and expression of the face have gone on improving, and not only have the hair and skin become normal, and the fatty tumours and umbilical hernia disappeared, but the figure has grown more shapely, and the thorax, abdomen, and limbs have changed in size, so that they now bear a much more normal proportion to one another.

The voice has improved greatly and the abnormal snoring has altogether ceased. The temperature remains normal, and the chilliness, which was formerly such a marked feature, is no longer complained of.

During the first few months of treatment, the lessening of the morbid swelling left the limbs very thin and weak, and the appetite was poor. This muscular debility lasted for many months, but latterly (compare Plates III. and IV.), *pari passu* with the increase of mental energy and desire for exertion, there has been a considerable growth in the bulk and power of the muscles; and the appetite has been better than ever it was before.

The rapid appearance of the permanent teeth during treatment is of interest; but it is probably only partially due to the influence of the thyroid, as the writer has another cretin under observation, in whom the second dentition began also between eighteen and nineteen, although no thyroid had been given at that time.

The mental progress, if not so great as that of the body, is certainly very distinct. The lad is making no progress as yet with arithmetic, and very little in learning his letters, but he is now thinking and acting for himself in a way that he never did before.

His morbid shyness and dislike of strangers has given place to the unrestrained familiarity and talkativeness of a little child, and his habitual discomfort and torpor to a normal sense of well-being, and quite an average capacity for enjoying life. This latter change, as has been pointed out elsewhere,[1] constitutes one of the most important and striking of all the many phases of the improvement which follows the administration of the thyroid gland in this disease.

With regard to the mode of administration of the remedy and its dose, there are three points worthy of mention,—

[1] *Brit. Med. Journ.*, Sept. 23, 1893, p. 677.

merly he would never willingly go into any house except his own home.

May 28.—Face still improving. His nose is becoming of a better shape—the bridge apparently rising, and the alæ becoming less broad. His friends say that they now see in him a likeness to one of his relatives which they never noticed before. During the last fortnight the left lower permanent molar has appeared.

June 23.—The patient is still gaining in good looks and in intelligence, and also very steadily in strength and firmness of limb. There has been no growth in height for three months. To increase the dose to a quarter of a thyroid twice a week.

July 17.—Photographed. (See Plate III.)

July 31.—Height, 37 inches. Improving generally.

Sept. 23.—His sister, who is a teacher, has been trying for some time to teach him to count, but so far without the least success. One evening recently, being left alone, he took off all his clothes himself and went to bed, a thing which he had never done before. Height, 37⅜ inches.

Oct. 21.—Improving greatly in appearance; limbs becoming thicker and more muscular, thorax larger, and abdomen less. Appetite very good. Still a good deal of bronchial wheezing. Dentition progressing; he has now four molars and one bicuspid of the second set. The upper central temporary incisors are getting loose. Height, 37⅝ inches. Ordered three-eighths of a thyroid twice a week.

Nov. 21.—Growing markedly in weight from increase in fat and muscle. He is very docile and good-tempered, and is beginning to recognise a few of the letters of the alphabet. Ordered half a thyroid twice a week.

Dec. 16.—He is still steadily improving in every way, and has not had the slightest discomfort from the increase of dose. He has now eight permanent teeth, and measures 37⅞ inches in height. His mother says that now he is almost never still, and that when she is occupied with household work he takes a lively interest in everything she does, and always wants to fetch or hold things for her, or do anything he can to help her. He is also always smiling and happy. Before treatment he used to sit still and apathetic most of the day, paying scarcely any attention to her movements. He is never shy now, and talks freely in a childish way about his clothes, toys, etc. He is making no progress in learning to count, and very little in learning the alphabet.

Dec. 20.—Photographed. (See Plate IV.)

REMARKS.—The improvement, then, has continued and is still continuing steadily, although scarcely at the same rate as during the first two months.

The growth in height of the skeleton, which had been at a stand-

I.

A. C., aged 18 years and 8 months, at beginning of thyroid treatment, Dec. 25th, 1892. Height, 33½ inches.

still for about fourteen years, and was started again by the thyroid treatment, has amounted in the year to 4⅜ inches. Its rate has varied considerably from time to time, according to the amount of thyroid given. For some months the dose was evidently not sufficient to cause much growth; but latterly, with larger doses, the height has again increased steadily. In estimating the growth, however, the effect on the stature of the rapid bending of the lower limbs must not be forgotten.

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Firstly, With the exception of the first two or three weeks, when too large a dose was given, the treatment has caused no inconvenience at all, and it has not been necessary to confine the patient to bed, or even to the house.

Secondly, It has been pointed out that it might be preferable, on theoretical grounds, to give the thyroid in small doses frequently, rather than in larger quantities at longer intervals. The foregoing case, however (as well as others which the writer has recently had under observation), seems to show that the full effect can be obtained, without any observable drawback, by giving it twice a week. When the raw gland is given, this is, of course, much more convenient.

Thirdly, It is interesting to note that the patient is now, without the slightest discomfort, taking the same dose (half a thyroid twice a week) that a year ago made him very ill, and that this dose, indeed, appears now to be necessary if the full amount of improvement is to be maintained. Presumably a further increase of dose may be needed from time to time.

IV. Exhibition of Specimens.

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By JAMES MACKENZIE, M.D., Honorary Medical Officer to the Victoria Hospital, Burnley.

THE tendency of the right heart to dilate and to permit a regurgitant stream of blood to flow back into the auricle during systole of the ventricle, when undue opposition is offered to the performance of its work, has long been recognised. The manifestation of this regurgitation has been found in the veins, chiefly in those at the root of the neck. This outward and visible sign of the dilated right heart may be associated with little or no other

symptom of heart failure, or it may be a prominent feature along with other symptoms of extreme failure of the heart. The appearance of the movements in the veins are very diverse. Thus there may be but one large wave during a cardiac revolution, or there may be two or three. In the latter case, if the waves be small and the heart beating rapidly, the movements may simulate mere dancing vibrations. When, however, a graphic record is obtained, and these movements are accurately timed, the causes of the individual movements can usually be easily recognised. Thus a wave preceding the carotid pulse can only be produced by the systole of the auricle. In like manner, when a wave occurs in the veins synchronous with the carotid pulse, it can be referred with certainty to the systole of the right ventricle. It frequently happens that when there is a wave in the veins preceding the carotid pulse, and therefore due to the auricular systole, that there is also a wave due to the systole of the ventricle. Its time of appearance is delayed for a longer or shorter interval after the carotid pulse. As this wave is due to blood regurgitating through the tricuspid orifice during the ventricular systole, and as during the ventricular systole the auricle is in diastole and is sucking blood into its cavity, the wave cannot appear in the veins till the auricle is filled. The overplus sent back from the right ventricle then appears as a wave in the veins of the neck. Under circumstances producing incompetence of the tricuspid valves, the blood escapes during the ventricular systole from the ventricle in two directions, namely, through the pulmonary and tricuspid orifices; upon closure of the pulmonary valves there is a temporary increase in the wave sent back through the tricuspid orifice. This increase of the wave is frequently manifested in the tracings by a sudden rise in that wave which is due to the systole of the ventricle. Indeed, it may be the only part of the ventricular wave present in the veins. Usually the wave due to the ventricular systole is divided into two parts by a notch of varying depth. The bottom of the notch indicates the time of the closure of the pulmonary valves, the part preceding the notch being due to the ventricular systole after the auricle has been distended. The greater the tricuspid incompetence, the sooner will the auricle be filled, and the earlier will this portion of the ventricular wave appear. In cases of heart failure due to organic disease, owing to this great tricuspid incompetence the auricle may be so distended that it apparently becomes paralyzed. Under such circumstances the auricle ceases to manifest its activity by any venous wave, and there is then produced but one wave synchronous with and due to the ventricular systole. Such a wave usually presents a notch indicative of the time of the closure of the pulmonary valves.

The venous pulse may thus be divided into two forms, viz., the auricular venous pulse and the ventricular venous pulse. The first is that form which presents distinct evidence of the

functional activity of the right auricle. In this form there is also a wave due to the ventricle, and as it increases the auricular wave decreases and finally disappears, and thus the form called the ventricular venous pulse is developed. The ventricular venous pulse is but a more advanced stage than the auricular; and as during its development there is a gradual fading of the auricular wave, there is a period when such terms do not sufficiently denote the character of the pulse. But the terms are convenient for descriptive purposes. The ventricular venous pulse only appears when there is organic disease of the heart itself (most commonly in valvular disease). When the failure of the heart is functional and not due to organic disease of the valves, the auricular pulse persists to the end.

Similar types of pulses may be recognised in the liver. Here the pulse only appears when there is organic disease of the heart.

In many respects more information regarding the various cavities of the heart can be obtained from the study of the venous pulse than from that of the arterial pulse. Thus during a cardiac revolution the arterial pulse is in free communication with but one chamber, the left ventricle, during but a portion of the time, whereas in the venous pulse we may observe the effects of the right auricle during its systole and during its diastole, while the time of the appearance of the ventricular wave gives us information regarding the degree of incompetence of the tricuspid orifice. We can also gather information regarding the exact time of closure of the pulmonary valves, and note the persistence of the ventricle in systole for a short space of time after the outflow through the arterial orifices has ceased. There is also in the venous pulse distinct evidence of the diastole of the right ventricle.

In the study of heart failure the venous pulse affords information of a kind totally different from that supplied by any other means at our command. Thus its appearance, increase, decrease, and disappearance may afford evidences of changes in the blood-pressure quite inappreciable by any signs given by the arterial pulse. While, as a general rule, an increase of the venous pressure implies a diminution of the arterial pressure, this is, nevertheless, not always the case. While one may say that in certain cases the disappearance of the venous pulse is a sign of the restoration of the body to a more healthy condition, yet, paradoxical as it may seem, the disappearance of the venous pulse in other cases may herald a fatal issue. In these last cases there is also a failure of arterial pressure.

In pulse irregularities no true knowledge of the action of the different chambers of the heart can be obtained except by the study of the venous pulse. When, for instance, by means of the clinical polygraph a record is taken at the same time of the venous and radial pulses, we have before us a written account of the actions of three out of the four chambers of the heart. Hitherto

it has been impossible to differentiate the nature of the movements in irregular heart action. A study of the venous pulse throws a new light upon the heart movements, and reveals a variety of these hitherto unsuspected.

Dr G. A. Gibson said that there could be but one opinion among the members of the Society as to the extreme value of Dr Mackenzie's paper. By the results which he had placed before them, the views of Friedreich upon the venous pulse, which had so long held the field, appeared to have received their quietus. For his own part, his views regarding the venous pulse had been dominated by the teaching of Friedreich, and, although he had read most of the works on the subject which had preceded Dr Mackenzie's, he could not claim any opinions of his own. The observations of François-Franck had thrown considerable light upon the venous pulse. One of his most interesting observations was, that by merely causing asphyxia in certain animals, and by making persons hold their breath, a venous pulse was produced such as was seen in tricuspid incompetence. The explanation was simply that with a very slight excess of pressure in the right ventricle a communication was established through the tricuspid valve into the auricle. He agreed with Dr Mackenzie's explanation of how the waves of the venous pulse occupied the relative positions they were found to have, but was inclined to ask Dr Mackenzie to explain more fully that part of the error which he had called the arterial, and which was so far in advance of the regurgitant ventricular impulse. The most valuable part of the paper was probably that in which he explained certain phenomena which were first described by Leyden of Berlin, and afterwards more fully by Roy, and interpreted by them as indicating that there might be, under certain conditions, contraction of one ventricle without contraction of the other. Dr Mackenzie's explanation that in such cases there was simply a contraction of the right auricle was perfectly rational, and probably correct. It was confirmed by what could be observed when watching the heart of any animal dying, namely, that the right auricle might go on beating after the rest of the heart had stopped. Dr Gibson then handed round a venous pulse-tracing of a kind which, he said, as far as he knew, had not been shown before. It was obtained from the back of the hand of a case of aortic incompetence and pneumonia, with consequently very low arterial pressure. The pulsation was produced by direct pressure from the arteries passing through the capillaries.

Dr Byrom Bramwell said he was much struck with the extreme ingenuity Dr Mackenzie had brought to bear on this subject, especially in devising a satisfactory method of timing and recording these various phenomena on the same paper, without which it would have been impossible for him to reason them out,

and to form the conclusions about them that he had come to. He hoped that Dr Mackenzie would not be content with the work he had done, but that he would continue it and apply his experience and great mechanical skill to the devising of some instrument which would enable them more satisfactorily and readily to record the working of the apex-beat than they were at present able to do. This work of his would, he believed, enable him to differentiate and separate many of the obscure phenomena connected with cardiographic tracings, which it was extremely difficult for others to do who had not had the same special experience. He had set before them facts, and his interpretation of them, it seemed to him, was admirably lucid and convincing. Like everybody else, for years past he (Dr Bramwell) had been struck with the fact that in certain cases one got a slight flickering pulse in the neck, the interpretation of which had been very difficult, especially as in many of them there was no auscultatory evidence of tricuspid regurgitation. He had found it often exceedingly difficult to time the exact rhythm of the pulsation. Dr Mackenzie, by showing that one part of the venous pulse was at times auricular and at others ventricular, explained much of the difficulty they had hitherto experienced in dealing with these cases. Many of his other tracings were also of extreme value. They showed, in a way that it had been impossible to demonstrate before, the exact relationship of the ventricular and auricular contractions in cases of mitral stenosis in which there was an apparent discrepancy between the heart's action and the pulse.

Dr Graham Brown remarked that he thought he saw in Dr Mackenzie's work a prospect of arriving at a means of determining the condition of the walls of the heart, which they had as yet almost no means of doing. If this was so, he could imagine no more important contribution to medicine than the paper which had been read.

Dr Noël Paton said that Dr Mackenzie's paper was a clear indication of what the physician could do for physiology. No point had interested him more than the record in the human heart of an auricular systole in the absence of the ventricular, which investigation in animals had shown to occur under certain conditions. He did not agree with Dr Mackenzie in his interpretation of his so-called ventricular wave, but regarded it as simply due to stasis. He asked Dr Mackenzie to tell them something more about the interpretation of the "arterial" wave of the venous pulse.

Dr James Mackenzie, in replying, said the arterial wave was not a venous wave at all, but was due to the impulse from the carotid artery, with the pulsation of which it was always synchronous. It was never seen in the liver pulse, nor when there was a very small arterial pulse, nor when, as was represented in one of the diagrams, there was no carotid pulse. The explanation of why the ventricular wave was so long in appearing was that the

dilated auricle had to be refilled by the reflux of blood before the wave appeared in the veins. If the tricuspid was largely incompetent the auricle filled very early and the wave appeared sooner. If the rise were due to a mere stasis, as had been suggested, the line of curve would have been a gradual ascent, but it was steep. This was one of the strongest arguments in favour of there being an active agency producing it. He believed that the irregularities in the ventricular contraction to which he had alluded were not due to stimulation of the vagus, which it had been proved produced first an irregularity of the auricular contractions. The auricles had acted regularly. With regard to slight flickering of the venous pulse to which Dr Bramwell had referred, he had obtained tracings from such cases, in which it appeared as dancing vibrations. They could be exactly timed by his method, although to the eye they were so slight as to give rise to only flickering movements.

The President conveyed the hearty thanks of the Society to Dr Mackenzie for his paper.

2. A CASE OF CANCER OF THE BREASTS, SPLEEN, AND OTHER ORGANS, WHICH PRESENTED MANY FEATURES OF CLINICAL AND PATHOLOGICAL INTEREST.

By Byrom Bramwell, M.D., F.R.C.P. Ed., Assistant Physician to the Edinburgh Royal Infirmary; Lecturer on Practice of Physic, Edinburgh School of Medicine, etc.

The following case presents many points of interest both from a clinical and pathological point of view. The history is as follows:—

A. F., aged 40, single, housekeeper, who was kindly sent to me by Dr T. F. Spence, was admitted to the Edinburgh Royal Infirmary on January 3rd, 1893, suffering from multiple tumours in each breast, and complaining of loss of vision in the right eye, pains in the legs, emaciation, and debility.

Previous History.—Until the last four years the patient lived at home, and was comfortably situated in every respect. Since the death of her parents, four years ago, she has had a good deal of work and worry. She enjoyed good health until *May* 1890, when she, for the first time, became aware of the presence of a tumour in the left breast. After a day of hard work, which involved lifting heavy weights, she felt a sharp pain in the left breast. On examining the breast she found that a hard lump about the size of a walnut was situated below the nipple. (This tumour, which had doubtless been in existence for some time before it was observed, proved on post-mortem examination to be a fibroma.) She says that the original lump has not increased in size since it was first noticed, but it has become harder and less

movable. Since last October many new lumps have developed on both breasts and other parts.

In January 1892 the patient had an attack of influenza, and although she was only laid up for a few days, she has never been well since.

In July 1892 she was seized with sharp "gripping" pains in the back; these pains radiated round the abdomen. Soon afterwards she experienced pains, which she thought were rheumatic in character, in the shoulders and legs. The pains, which were especially severe in the right hip and left groin and thigh, radiated down the thighs and legs. About the same time the little and ring fingers of the left hand and the left foot became numb, and she experienced a feeling of numbness on the top of her head.

In October 1892 she noticed that many new lumps were developing not only in the left but also in the right breast, and in the skin on the front of the thorax and abdomen. She does not think that these lumps have materially increased in size since they were first noticed, but they have become more numerous; they have never been tender on pressure, or painful.

Towards the end of October spasmodic twitchings affected the right eye, and the patient saw objects double. About the same date the sight of the right eye became impaired, the dimness of vision rapidly increased; in the course of a month the loss of sight in the right eye was so complete that the patient was unable to distinguish light from darkness. She states that at this time the right eye was more prominent than the left, and that it "felt stiff."

For a month prior to her admission to hospital she has been unable to walk without assistance, owing to the pain in the left hip and thigh.

Six weeks ago she was sent by Dr Spence to Dr Allan Jamieson, who agreed with Dr Spence in thinking that the case was one of multiple cancer.

For several months past she has been gradually losing flesh, and is now considerably emaciated. In answer to direct questions she states that there has been no headache, no vomiting, no giddiness.

THE FAMILY HISTORY is unimportant. Her father died of pleurisy at the age of 71; her mother, of a "stroke" at the age of 75. She has five brothers and one sister alive and well. One member of the family (a brother, a twin with her) died when three weeks old. None of her relatives, so far as she knows, have ever suffered from cancerous or other tumours. So far as she knows, there is no hereditary disease either in her mother's or father's family. Both her father's and mother's relatives have been long-lived.

PRESENT CONDITION.—The patient is pale and thin, the legs in particular being emaciated. So long as she is lying on her back she is quite comfortable, but the slightest movement causes pain in the left hip, thigh, and leg.

The Condition of the Breasts.—Both breasts are infiltrated with innumerable small hard nodules, which are very uniform in size, being for the most part about the size of a garden pea. In the left breast a larger nodule, about the size of a small walnut, is situated below the nipple, which is somewhat pulled down but not retracted by the new growth. The nodules of new growth, though packed in close contact with one another, are, for the most part, isolated and unadherent. They seem to be situated in the milk ducts or lymphatics. When the breast is grasped in the hand the impression conveyed to the mind resembles that which would be produced by grasping a bag tensely distended with peas.

Numerous nodules spread out from each breast in the form of radiating chains (see Fig.). Some of these chains run almost up to the clavicle, others pass towards the axillæ, others towards the middle line, and a few run down towards the abdomen.

Several isolated nodules, varying in size from a small shot to a large pea, are situated in the subcutaneous tissue on the front of the chest and abdomen; a group of nodules is situated round the umbilicus. There are some subcutaneous nodules in each axilla, several on each side of the neck, many in each groin, and one behind the left ear at the junction of the skin with the scalp. There are no nodules in the flexures of the hams or elbows. All of these nodules (with the exception of one or two on each side of the neck and in each axilla, which are somewhat larger in size) are about the size of a small pea; they are all very hard, freely movable, and quite painless; the skin over the nodules, which are colourless, is quite normal. Some of the nodules in the neck and one or two in the axillæ appear to be enlarged glands, but the vast majority of the nodules of new growth do not appear to be glandular.

Abdomen.—No nodules or masses of new growth can be detected in the abdominal cavity on palpation from the front.

The *liver* is markedly enlarged. The hepatic dulness extends from the fourth rib above to a point 2½ inches below the costal margin in the line of the nipple; the lower margin of the liver in the mammary line reaches the level of the umbilicus, the extent of the absolute dulness being 6 inches. The liver feels hard and resisting to the touch, but is not painful or tender on pressure.

The tongue is clean; the appetite fairly good; the bowels inclined to be loose.

The *spleen* is considerably enlarged.

The *blood* corpuscles number 3,430,000 per cubic millimètre; and the hæmoglobin = 65 per cent. The corpuscles, both red and white, are normal in shape and size, and the blood does not, so far as the microscopical examination enables one to judge, contain any abnormal constituents.

The *right eye* is completely blind—the patient cannot distinguish light from darkness. The movements of the right eyeball are very much impaired. The patient is unable to elevate the right eyeball,

CASE OF A. T.—MULTIPLE CANCER.

Before the photograph was taken, the cancerous nodules in the breasts, axillæ, neck, and skin of the abdomen and thorax were individually painted black.

While the photograph was being taken the patient was made to look up to the ceiling. The right eye remained immobile, but the right upper eyelid was distinctly raised.

The dark patch on the inner side of the left breast represents the point (covered with collodion) from which a cancerous nodule was excised.

The dotted lines show the size of the liver and spleen on April 1st.

but when she makes a powerful effort to look upwards the right upper lid is distinctly raised (as much as the lid on the opposite side—see Fig.), and a ring of the sclerotic is uncovered. The downward, outward, and inward movements are also markedly impaired, but not completely lost.

The right pupil is dilated, measuring 4 millimètres; it fails to contract when a beam of light is thrown directly into it; but it distinctly contracts, though less actively than that of the left, during an effort of accommodation; and it actively contracts when a beam of light is thrown into the opposite (left) eye. The right retina is pale and somewhat œdematous, but there is no papillitis. The disc is fairly well defined; the œdema seems to be a general passive swelling of the disc and retina. The vessels of the right fundus (both arteries and veins) are distinctly contracted.

The right eyeball is perhaps slightly more prominent than the left; but if so, the difference is very slight. There is no tenderness on pressure either over the eyeball or any part of the orbit. The tension of the eyeball seems normal and equal to that of the left.

Vision in the left eye is perfect; but the left, like the right retina, is pale, and the vessels of the left fundus appear to be somewhat smaller than normal. The left pupil is active, and the movements of the external muscles of the left eyeball are absolutely normal,—in fact, unusually free.

The legs are very thin, the muscles of the calves being very soft and much atrophied. The knee-jerks are exaggerated on both sides, more markedly so perhaps on the left than on the right; there is no ankle clonus; the plantar reflexes are lively and equal on the two sides. The patient complains of numbness in the right heel, but no derangement of the sensibility of the skin can be demonstrated by objective tests.

The grasping power of the right hand, as measured by the dynamometer, equals 30; that of the left, 40.

The *urine* is normal.

The *circulatory* and *respiratory systems* appear to be normal, but the heart-sounds are weak.

The *temperature* on admission was normal; the *pulse* 92, small and weak.

DIAGNOSIS.—The case seems to be one of cancer. The condition of the breast is, however, quite peculiar. The loss of vision and the paralysis of the ocular muscles in the right eye are probably due to the presence of secondary deposits at the back of the orbit or around the sphenoidal fissure. The enlargement of the liver is probably due to a secondary cancerous infiltration.

TREATMENT.—Morphia, in sufficient doses to relieve the pain, was prescribed, and complete rest in the recumbent position was enjoined.

PROGRESS OF THE CASE.—*January* 7.—The patient had a very restless night; she feels tired and weak to-day; in consequence,

she thinks, of an attack of diarrhœa, for which salicylate of bismuth —10 grains three times a day—was prescribed.

January 9.—Diarrhœa better; patient brighter. A mixture containing arsenic, strychnine, and liquor pepticus was prescribed.

January 12.—Bad night; disturbed by another patient in the ward; less pain in the legs.

January 15.—Mr Stiles, who had kindly seen the patient with me more than once, and who agreed in thinking that the condition of the breasts was very remarkable, removed one of the isolated subcutaneous nodules on the front of the chest, with the object of determining the exact nature of the new growths. After hardening, the sections showed the characters of scirrhous cancer.

January 19.—The patient complained to-day of neuralgic pains in the right side of the head. She says that she has frequently experienced the same sort of pain at night, but she again distinctly states that she has no true internal headache.

February 8.—The deposits in the breasts are larger, and the nodules in the groin and on both sides of the neck are more numerous.

February 22.—A rectal and vaginal examination was made to-day, with the object of trying to determine whether any cancerous deposits were present in the pelvis, which by pressing upon the nerves could account for the pains in the thighs and legs.

No nodules were felt per rectum; but several small hard nodules, exactly like those in the skin of the thorax and abdomen, were felt in the upper part of the vagina, just below the mucous membrane. The mucous membrane of the vagina at its reflection from the uterus was smooth, tense, markedly œdematous, and tender on pressure.

March 3.—The patient to-day complains that the sight of the left eye is becoming dim. She can no longer read with comfort with the left eye, and is consequently much depressed. The liver and spleen are increasing in size; the nodules in the breasts are more numerous; in the centre of the breasts, they give one the impression of being much more closely packed, and in places adherent to one another.

March 30.—The patient says that she feels better and stronger, but she is certainly thinner. The red corpuscles now number 2,410,000, and the hæmoglobin = 46 per cent. Vision in the left eye is almost *nil*, though the patient can still distinguish light from darkness with this eye.

April 1.—The liver and spleen, more especially the spleen, are much larger than they were a month ago; both organs feel very hard and stony; the surface both of the liver and spleen is quite uniform and smooth. Firm pressure over the enlarged liver and spleen does not cause any pain, uneasiness, or discomfort. The upper part of the left femur is enlarged, nodulated, and tender on pressure.

The patient is rapidly going down hill; she looks no worse in the face, and she says that she feels better and brighter. The liver dulness now measures 12 inches in the line of the nipple. The tongue is clean; the appetite still remains pretty good. There is no headache, no sickness, no jaundice. Both pupils are now widely dilated; the left still contracts to the stimulus of light, but much less actively than normal. Both pupils still contract feebly on an effort of accommodation. The upward, downward, and lateral movements of the left eyeball are now slightly impaired.

On ophthalmoscopic examination the fundus in each eye is pale, and the vessels (both arteries and veins) small. The eye-ground in both eyes is pale and slightly œdematous, but the discs are well defined, and there is no papillitis.

April 6.—The morphia which the patient has been taking since admission to be repeated in larger doses whenever the pains are troublesome or the patient is restless or uneasy.

April 17.—The patient complains of pain in the chest and shortness of breath, but nothing in the lung or pleura can be detected to account for the dyspnœa. The abdomen is much distended and flatulent. The heart sounds are very weak. The percussion note over the right base is considerably impaired, but this is apparently due to the enlargement of the liver. Several small subcutaneous nodules have developed over the back of the trunk. The feet are swollen.

April 24.—The patient is quite blind; she cannot now distinguish day from night. The abdomen is more swollen, and contains some fluid. The liver and spleen are still increasing in size. The left femur is more swollen. Fine crepitations and bronchial râles are audible over the front of each chest. The patient is so weak that the back was not examined. The œdema of the feet is increasing.

The temperature has continued practically normal since the date of her admission. There have been occasional slight rises, the highest point reached being 101° on March 22nd. The pulse has ranged from 80 to 110.

May 1.—Patient died to-day.

POST-MORTEM APPEARANCES.—The post-mortem examination was made by Dr Leith on May 2nd, twenty-seven hours after death.

The body was much emaciated. The lower extremities were markedly œdematous, the skin being white and shiny. The abdomen was considerably swollen; the enlarged liver and spleen could be both seen and very distinctly felt through the front wall of the abdomen. The peritoneal cavity contained some free fluid.

Both breasts were infiltrated with numerous small hard nodules, the exact character of which has been previously described; chains of nodules radiated out from the breasts towards the clavicles, axillæ, middle line, and abdomen. Many small isolated nodules

were scattered here and there over the front of the thorax, abdomen, and back. Several small hard nodules, and one or two enlarged glands, were present in the axillæ. Many small pea-like nodules were present in the groins, and there were several on each side of the neck. With rare exceptions, the nodules were of small size, very few of them reaching the size of a horse-bean.

The *abdomen* contained a considerable quantity of clear straw-coloured fluid. The *mesentery* was much retracted; many small nodules were scattered through its meshes; it was not thickened; it did not form a transverse coil in the upper part of the abdomen, as the cancerous mesentery is apt to do.

The surface of the *peritoneum* was thickly studded with small nodules, which varied in size from a pin's head to a split pea.

The *liver* weighed 4¼ lbs., and was studded throughout with innumerable white cancerous nodules, most of which were round and of small size, few of them being larger than a large pea. The surface of the liver was quite smooth and uniform, and the capsule of the organ was not thickened or inflamed; none of the nodules projected above the surface of the organ; a few of them which were situated just below the capsule were slightly depressed in their centres. In the left lobe the cancerous nodules were so closely packed that the whole liver substance seemed to be uniformly infiltrated with cancer; in some parts of the right lobe the nodules were more isolated, but in no part of the right lobe was there any portion of liver substance larger than a sixpence which was unaffected.

The *spleen* was enormously enlarged and hard; it measured 8¾ inches in length, 4¾ inches in breadth, and 4¼ inches in thickness, *i.e.*, from before backwards, and weighed 3 lbs. 14 oz. Its surface was absolutely smooth and uniform; the capsule was not thickened, but was translucent and glistening in appearance. On section the organ was found to be infiltrated with innumerable small cancerous nodules; the nodules, which were for the most part round, varied in size from a pin's head to a large pea, running here and there into one another. In some places the individual nodules could be distinctly seen through the capsule, which was neither thickened nor opaque.

Both ovaries were enlarged, each about the size of a large walnut, hard and irregular on their surface; they contained several small nodules. Several small nodules were situated in the upper part of the vagina; one in the uterus. Many small nodules were situated immediately around the sciatic nerves in the pelvis.

The *kidneys* each weighed 6 oz.; numerous small deposits of cancer were present just below the capsule: several small deposits in the cortex, and a few in the pyramidal portion.

The *suprarenal capsules* were surrounded by many small nodules. They were of normal size and thickness. On section, numerous small cancerous deposits were seen in the substance of the

capsules; in places these deposits were confluent, and had entirely replaced and destroyed the gland tissue.

One small nodule was found in the *pancreas*. Three small nodules were situated in the *stomach*, beneath the mucous membrane. None were found in the intestines.

The *left pleural sac* was practically dry.

The *right pleural cavity* contained a small quantity of clear straw-coloured fluid.

The *pericardium* contained ½ oz. of clear straw-coloured fluid.

The *heart* was small; it weighed 10½ oz. Numerous cancerous nodules of small size were situated just beneath the pericardium, on the surface of both ventricles and both auricles; they were more numerous over the posterior surface of the left ventricle, near the apex, than elsewhere. The muscular substance and valves seemed healthy.

Many small nodules of new growth were situated beneath the *parietal pleura*. Innumerable small nodules about the size of miliary tubercles were scattered over the surface of each lung, just in the *visceral pleura*. One or two dark pigmented nodules the size of a small pea were found on section just below the pleura, and slightly infiltrating the substance of the lung. The bronchial glands were slightly enlarged, and infiltrated with nodules, which to the naked eye looked like grey tubercles, but which on microscopic examination were found to be cancerous.

The *dura mater* was thickened, and infiltrated with innumerable cancerous nodules, some of them as large as a split pea. The thickening and infiltration were most marked over the vertex, and in the anterior and middle fossæ at the base. The soft membranes were unaffected; they stripped readily off from the surface of the brain. The brain substance itself seemed to be perfectly normal.

The thickening of the dura was very marked around the sphenoidal fissures, especially the right sphenoidal fissure; the optic and other nerves were nipped and compressed by the thickened dura as they passed from the cranial cavity into the orbits. There was nothing found in the orbital cavities nor in the eyeballs, so far as could be discovered with the naked eye.

The *spinal dura mater* was much thickened in the mid-dorsal region, and some of the nerve roots (more especially the posterior roots, for the thickening was more marked on the posterior than on the anterior surface of the spinal dura mater) were compressed. The cord appeared to be normal.

The upper third of the left *femur* was considerably thickened, softened, and bent. The surface of the bone was irregular and nodulated. Numerous small cancerous nodules could be seen and felt beneath the periosteum; they extended over the whole surface of the bone to within a few inches of the knee. The bone was removed *en masse* for separate examination; on section, the bone

tissue and the central canal were found to be thickly studded in the upper third with typical nodules of cancer.

The larynx, thyroid gland, and œsophagus were free from nodules; the thyroid gland was somewhat small and atrophied.

REMARKS.—This case presents many points of unusual interest. The more important are as follows:—

1. The peculiar character of the breast lesions, and the remarkable way in which the cancer was evidently making its way along the lymphatics.

2. The widespread diffusion of the cancer throughout the body. The breasts, liver, spleen, ovaries, peritoneum, pleuræ, dura mater, and periosteum of the left femur were thickly studded with small cancerous deposits, which were very uniform in size. The skin, pericardium, mesentery, suprarenal capsules, femur, stomach, and pancreas, all contained nodules.

3. The remarkable condition of the spleen. The organ weighed 3 lbs. 14 oz., and measured $8\frac{1}{2} \times 4\frac{3}{4} \times 4\frac{1}{4}$ inches. The enlargement of the spleen was due to the deposit of innumerable small nodules, which were so thickly set as to produce a diffuse cancerous infiltration. Secondary deposits of cancer of the spleen are at any time very rare. I have never seen anything like the cancerous enlargement of the spleen which was present in this case.

4. The fact that the cancerous liver and cancerous spleen were perfectly smooth and regular on their surfaces, and that the capsules of both organs were in no way thickened or inflamed.

5. The diffuse cancerous infiltration of the dura mater, which was unattended with any symptoms except those due to constriction of and pressure on the optic and ocular nerves.

6. The cancerous infiltration of the left femur. Beautiful nodules of cancer were seen both in the periosteum and on section throughout the bone.

7. The remarkable absence of symptoms associated with the innumerable deposits of cancer in so many of the most important organs of the body. The cancerous nodules in the breast, and the cancerous enlargement of the liver and spleen, were absolutely painless. The pain in the legs seemed to be due to pressure on the nerves in the pelvis, and to the cancerous infiltration of the left femur and its periosteal covering.

8. The total loss of vision and the paralysis of the ocular, due to compression of the nerves by the thickened dura, as they passed from the cranial cavity into the cavity of the orbit. The absence of optic neuritis is also noteworthy.

9. The complete absence of headache, sickness, and other symptoms of cerebral disturbance. This was a remarkable feature of the case.

10. The fact that although the liver and spleen were infiltrated with cancer, the resulting enlargement was quite regular, smooth, and painless. I have met with several other cases of cancer of the liver of the same kind. They constitute exceptions to the rule that the enlargement of the liver which is produced by cancer is irregular and painful. In cases of this kind, the stony hardness of the liver is of more importance as a diagnostic of cancer than the irregularity of the surface. But in such cases, unless there are other cancerous deposits elsewhere, the differential diagnosis from cirrhosis is very difficult, sometimes impossible. In this case there was no jaundice, and until the later periods of the case no ascites.

11. The absence of symptoms of Addison's disease, notwithstanding the dense cancerous infiltration which surrounded the suprarenal capsules and the presence of many small cancerous nodules in the tissue of the capsules.

In the article on Addison's disease in the first volume of my *Atlas of Clinical Medicine* (page 69), I have discussed at length the morbid anatomy and pathological physiology of the disease, and have summed up the discussion in the following terms:—"The theory which in my judgment is by far the most satisfactory is that which supposes—(1), that the lesion of the capsules is primary; (2), that as a result of that lesion the nervous structures in the neighbourhood of, or connected with, the capsules, are implicated; and (3), that it is to the nerve disturbances produced in this manner that the symptoms of the disease are for the most part due. It is perhaps possible that some of the symptoms of Addison's disease may be the direct result of abolition of the (glandular) function of the suprarenal capsules. Because complete (cancerous) destruction of both suprarenal capsules does not produce the characteristic and typical symptom of Addison's disease (I mean the pigmentation), it does not, of course, follow that abolition of the function of the suprarenal capsules does not produce any symptoms whatever."

12. The condition of the visceral pleura. This was very interesting from a pathological point of view.

13. The complete absence of all inflammatory disturbance around the cancerous nodules. Notwithstanding the cancerous infiltration of the liver, spleen, pleura, pericardium, and dura mater, there was no trace of perihepatitis, perisplenitis, pleuritis, pericarditis, or meningitis.

14. The fact that, notwithstanding the complete inability to raise the eyeball, the upward movement of the upper lid was still retained.

Report upon the Microscopical Condition of the different Organs, with Remarks upon the Pathology of the Case.

By R. F. C. Leith, F.R.C.P. Ed., Pathologist to the Royal Infirmary; Lecturer on Pathology, Edinburgh School of Medicine.

Parts of the mammæ, lung, heart and pericardium, liver, spleen, suprarenal bodies, kidneys, peritoneum, stomach, dura mater, and bone marrow were selected for microscopic examination. They were fixed in corrosive sublimate, hardened, embedded in paraffin, and cut with a rocking microtome. The sections now shown were stained with logwood, rubin and orange, and with binodi; and the following is a synopsis of a more detailed account prepared by me of the main changes observed microscopically, and of the many questions of pathological interest suggested by the facts of the case:—

The Mammæ.—As seen under a low power, a general and somewhat diffuse infiltrating cancer is disclosed. The striking nodular appearance to the naked eye is now hardly so apparent, but distinct foci are everywhere visible, with spreading margins and communicating chains, between which are areas showing the normal secreting gland-tubes and their ducts. These are separated from the cancerous growth by well-defined and dense fibrous bands in some places, while in others only a slight barrier of fibro-cellular tissue intervenes. The secreting cells of the gland have not taken the stain well, their protoplasm being pale and their nuclei indistinct. The duct epithelium, on the other hand, has mostly stained well, its nuclei being clear and distinct. The pre-existing bloodvessels of the gland, wherever visible, seem to show a considerable thickening of their adventitia. No cancer cells can be detected in the lumen. The outlying lymphatics are occasionally seen to contain a few cancer cells, never so numerous as to form a complete plug. The cancerous foci are of varying size, and show a considerable variation in the amount of their fibrous stroma and in the size of their alveoli. Towards the centre the fibrous stroma is mostly denser than towards the periphery, and the alveolar spaces are mostly small. Some are long and tubular, others short and irregular. Their infiltrating margins scarcely show a distinct alveolar arrangement—rather an ill-defined, somewhat delicate network. Bloodvessels are sparsely present in all parts of the growth. The cancer cells are nearly all remarkably small. Some alveoli, especially towards the periphery, contain only two or three, others contain many. Those towards the centre of some of the foci are apparently much degenerated. While a few of the cancer cells are fairly large, each with a well-defined nucleus, sometimes two, and distinct protoplasmic substance, the great majority are smaller than leucocytes, with very little protoplasm and large clear nuclei. The cancerous nature of the growth is undoubted, but it is not at all typical; in places it is distinctly

of the scirrhous, and in others of the encephaloid type. Its appearances and extensions indicate that it is of comparatively rapid growth, that its cells are prone to degenerate, and, being carried by the lymphatic vessels of the gland, have everywhere along the course of these vessels been deposited as cancerous thrombi, which have formed the centres of new foci.

The Lungs and Pleuræ.—The deeper layer of the visceral pleura is everywhere implicated by cancerous growth. The lymphatics are extensively and apparently universally filled with cancer cells, while at close intervals there are little areas of cancerous growth around them, consisting of fairly well-formed alveoli, more or less completely filled with the same small form of cancer cells as were so plentifully observed in the mammæ. In some of the alveoli they show a tendency to form a lining to the spaces. This cancerous infiltration is seen throughout the thickness of the pleural membrane, but is always most marked towards the deeper layer. It encroaches, but only slightly, on the lung substance in certain parts, and shows some tendency to pass along the lymphatics of the interlobular septa. There are no cancer cells in any of the bloodvessels so far as can be seen, although some of the vessels showing cancer cells abundantly also show red blood corpuscles. This obviously suggests that such vessels may be small veins; but I am rather inclined to look upon them as lymphatics into which small hæmorrhages have taken place. The parietal pleura did not differ materially from its visceral layer. In no part of the lung substance was any separate cancer nodule or growth detected, though a few small black nodules, which lay in the deeper layers of the pleura and in the lung substance close to it, showed a much pigmented fibrous tissue, with cancerous implication here and there.

The Bronchial Glands.—They were implicated to a varying extent,—in parts showing an extensive growth of small-celled cancer, and in others scattered foci of the same nature. Their capsule was not thickened nor their surface irregular. There was no sign of tubercle throughout the glands.

The Heart and Pericardium.—The general structure of the pericardium and epicardium was unaltered, but everywhere along the latter were nodules of cancerous growth, some of which were quite invisible to the naked eye, and others easily visible. At these sites the epicardium was increased in thickness, diminishing to its normal between the separate foci. None of the sections showed any continuity between the separate cancerous foci, which were as distinct microscopically as they appeared to be to the naked eye. The structure of each focus is not that of typical cancer. It shows a general cancerous infiltration of the lymphatic and tissue spaces lying between and around the fat cells of the deeper layer of the epicardium. Towards the surface there appears to be a new formation of a fine cancerous stroma, but it is confined to the

deeper layer of the epicardium, being in no part seen to invade the denser superficial layer. Towards the muscular substance there is no infiltration along the intermuscular septa, and there is no implication of the muscle substance. The cancer cells are here also very small, but they stain better than those of the mammæ, and appear to show much less degeneration. On the endocardial surface, towards the base of one of the papillary muscles of the left ventricle, a single cancerous nodule can be detected. It is composed of a finely fibrous stroma, with small alveoli filled with the same small vigorous-looking cells as are seen in the epicardium.

The Liver.—A considerable variety in the structure of the nodules is seen. The larger ones are much degenerated in the centre, and in parts there is much fibrous tissue. The liver substance around the nodules is acutely congested. Contiguous nodules, apparently separate to the naked eye, are now sometimes seen to be connected with one another, and such nodules often show a transition of structure from that of an adenoma to that of an ordinary so-called alveolar cancer. Thus in places the alveoli are lined by a single layer of cubical cells giving the appearance of glandular ducts; in others, while the wall is lined by a regular layer of cells similar to the last, the lumen also contains cells arising from proliferation of the lining layer, and still further away typical alveoli filled with cancer cells appear, showing a cancerous structure of the characteristic encephaloid type. The cancer cells are mostly small, closely resembling those already observed in the mamma, pleura, and epicardium. No large cells and no giant cells are anywhere visible. The lymphatics of some of the portal spaces, especially around the portal veins, are engorged with cancer cells, but the distribution is far more extensive than a mere lymphatic distribution alone could account for. The polymorphic and metamorphic character which cancer in the liver not infrequently assumes is well represented here.

The Spleen.—Sections were taken from many different parts, some involving the capsule, and others deep in the substance of the organ. A comparison of these sections reveals several questions of much interest in relation to the lymphatic and vascular distribution of the cancer cells. The subcapsular lymphatics seem pretty generally filled with these cells, but they are by no means confined to them. However well defined the separate nodules appeared to be to the naked eye, few of them are seen to be so now. A well-defined cancerous stroma is the exception, so that in very few places indeed is the structure of typical cancer revealed. Here and there, however, the alveoli are well formed, their walls of considerable thickness, and their included cells of large size. In most places the alveolar walls are delicate and their cavities small. The cancer cells are of the same small size as have been already seen to prevail elsewhere, though, as in the liver and epicardium, they

stain better than in the mammæ. The peripheral alveoli seem to communicate freely with the small venous sinuses of the pulp, as it is difficult to say whether some of the small spaces are cancerous alveoli with hæmorrhage into them, or small venous sinuses infiltrated in part with cancer cells. There are many leucocytes also in the spaces towards the margins of the foci, indicating the probability that many of these are really cancerous infarctions. Some of the larger veins of the splenic pulp appear to contain small cancer cells. The Malpighian bodies, wherever recognisable, seem to be unaltered.

The Suprarenal Bodies.—They are seen to be unequally implicated; in places there is no normal gland structure left, while in others it is clearly visible, being infiltrated on all sides by cancerous growth. The former show the older growth. The alveolar spaces are large, often rounded, and their walls are well formed and fibrous, but their included cells are mostly small, with a single clear nucleus and one or two nucleoli. This distinct alveolar arrangement gradually becomes less and less distinct where it merges into the general cancerous infiltration above mentioned. The capsule of the suprarenal is not much thickened, while the fibro-cellular and glandular tissues around the body are all extensively infiltrated with the same diffuse cancerous growth.

The Kidneys.—Separate nodules are seen in the capsule and invading the kidney substance. Other small ones are seen in the superficial cortex and in the mucous membrane of the calyces, and so implicating the apices of the pyramids, but none are seen embedded in the substance of the pyramids. These nodules are nearly all of the same structure, and more clearly circumscribed than they are elsewhere. The alveoli are mostly fairly well formed, and the cells are small, sometimes forming a distinct lining for the spaces, at others filling their entire extent. The Malpighian bodies are slightly congested. The straight vessels are also congested. The cells of the convoluted tubules are fatty. None of the vessels can be seen to contain cancer cells.

The Pancreas.—A number of minute rounded areas, invisible to the naked eye, are seen to be scattered irregularly through the substance of the organ, as well as beneath the capsule. They consist of alveoli, with delicate fibrous walls containing numerous small epithelial cells. Neither the bloodvessels nor the lymphatics of the gland seem to contain any cancer cells, and the nodules are sparsely and irregularly distributed.

The stomach shows a few small and similar nodules in its submucous tissue.

The Dura Mater.—The nodules upon the inner surface are seen to consist of a profusely growing cancer, more dense in its deeper parts than near the arachnoid surface, where it is delicate and spongy. Towards this surface the cells are abundant, and the stroma is delicate and scanty, but further out well-formed alveoli

are seen, containing the characteristic small cells already observed to be mainly present in all the organs. At the thickest and central part of each nodule the whole structure of the inner part of the dura is replaced by this cancerous growth. Close to the internal surface a few large sinuses filled with blood are seen to lie among the cancer cells. At the periphery of the nodule the thickness gradually diminishes, and there is a transition into the normal membrane. The outer layers of the dura, which is apparently nearly smooth on its cranial side, are seen everywhere opposite the internal nodules to contain spaces filled with cancer cells. These spaces seem mostly to be lymphatic vessels and tissue spaces injected with cancer cells, but here and there small nodular formations appear, similar in character to those so plentifully visible upon its inner face.

The Bone Marrow.—Many small nodules similar in character to those in the spleen are seen. The cancerous tissue entirely replaces the bone marrow, and consists of the same delicate stroma and abundant small cells. Towards the oldest part of the growth in the upper part of the femur there is much dense fibrous tissue, and few cells, which are of larger size than elsewhere. This growth is here seen to implicate every part of the bone and its periosteum, while in the lower more quickly growing parts isolated nodules are well seen, though their margin fades indefinitely into the red marrow.

REMARKS.—The striking appearance of both breasts is one of the most remarkable points in this remarkable case. The clinical history seems to indicate that the left breast was the starting-point of the disease, for the patient accidentally noticed the presence of a lump in it as early as May 1890, or nearly three years before her death. This lump was about the size of a walnut when first noticed, and appears to have been in and remained in a quiescent condition, for she stated that it did not increase in size, or materially alter its character up to and after the time of her admission in January 1893, under Dr Bramwell's care. It was not until October of 1892 that new lumps appeared apparently simultaneously, so far as patient herself could determine, in both breasts. I did not detect this original lump at the time of the section, and the parts selected for microscopic examination did not include any of it, so that I am so far unable to say whether it corresponded in structure to that of the other nodules or not. The length of time intervening between its appearance and that of the other nodules only suggests the possibility of their having an independent origin and structure.[1] There is no doubt whatever

[1] At the meeting at which this paper was read, Mr Stiles, to whom the left breast had been given for examination, stated that this primary nodule was a simple fibroma. This case, therefore, adds another instance of the comparatively rare association of a benign and malignant tumour in the same breast.

that one or both breasts were the primary seats of the cancer. I do not know of any instance in which the breast has become affected with secondary cancer. No such case has been recorded, if we except the instances of one breast becoming affected from the other, either before or after removal of the latter, although secondary nodules formed by lymphatic metastasis in the same breast are demonstrable in everyday experience. It is practically impossible in this case to say whether the disease began in the one breast and spread over to the other, or began in both simultaneously. The appearance of small cancerous nodules in chains between the two breasts may be equally indicative of a spread from a primarily to a secondarily infected organ, or a mutual inter-communication between two primarily infected organs. On either supposition the condition is a rare and remarkable one. The occurrence of more than one palpable primarily malignant tumour in one breast is in itself one of extreme rarity, if indeed it ever occurs; and even in cases in which they are said to have been observed, they have occurred as quickly growing nodules which soon coalesced. I do not here refer to the small and obviously secondary nodules so often seen and felt at a distance from the main tumour in a breast *after it has been removed.* For it will be remembered that the number of separate visible and palpable tumours in each breast before its removal in this case was very great. Nor do I mean to state that all these nodules were of primary growth, for the great majority were, as their clinical history, size, and microscopic characters showed, of undoubtedly more recent appearance and younger growth, and it is now practically impossible to say whether more than one was primary. The primary nodule or nodules had thus given rise to secondary and separate nodules in the same organ by a true metastasis which was mainly, if not entirely, by means of the lymphatic vessels. These were seen microscopically to contain cancerous plugs, partially filling them, and it is possible that some unusual particulate or chemical irritant derived from the cancerous growth in its course along the lymph stream in advance of the cancer cells, set up an irritation of the endothelial lining of the lymphatic vessels, causing some alteration in them which favoured the frequent and abundant settling down of the cancer cells upon their walls, and that such cancerous thrombi formed the nuclei of new nodules. The chains of nodules radiating towards the axillary glands on the outside, towards the neighbouring breast on the inside, towards the clavicles and neck above, and towards the lower part of the thorax below, are further evidence in the same direction. In regard to the last position, however, there arises this difficulty, that if the nodules result from a transportation of the cancer cells by the lymphatic vessels, such transference must have taken place in a direction contrary to that of the normal lymph stream. It is well known and recognised that bacteria may travel along the lymphatics in a direction contrary to that of the lymph

stream, but it does not follow that non-motile cells can do so. This difficulty is most easily met by supposing that from some cause the normal direction of the lymph stream upwards towards the axillary glands had been reversed. Such a condition is generally seen in the superficial veins of the thorax when the superior vena cava is obstructed. If such were the case here, it is easy to understand how the nodules around the umbilicus and those among the inguinal glands arose, for the lower thoracic lymphatics cross and mingle above the umbilicus with the superficial lymphatics of the greater part of the surface of the abdomen, which descend and converge towards the superficial inguinal glands lying along the line of Poupart's ligament. If this supposition be not correct, I can see only other two ways of accounting for their presence. 1*st*, By direct invasion. This might be aided, wherever possible, by the lymph stream, and in other places the line of communication between the separate nodules, although invisible to the naked eye, might be sufficiently obvious microscopically. 2*nd*, A late deposition into the lymph spaces after a transportation of the cancer cells by the systemic bloodvessels, and the formation of cancerous thrombi. It is noticeable that many of the nodules exist where no lymphatic glands are normally found, but this might easily be explained by the supposition that new or evoluted lymphatic gland foci had been found in these positions, a condition which Stiles[1] has shown to probably frequently occur in relation to the spread of cancer.

I have now to consider the method of spread to the parietal and visceral pleura. How is the apparent limitation to the lymphatic vessels and spaces and their neighbourhood in these membranes to be explained? Three possibilities present themselves. 1*st*, A direct transference from the mammæ through the chest wall to the parietal pleura. It is impossible for this to have taken place through the normal lymphatic channels, for the retromammary lymphatics all communicate with the lymphatics of the deep fascia which pass as large trunks to the lymphatic glands of the axilla, and do not in any way communicate with the lymphatics of the pleura. There remains, then, only a direct and continuous invasion of the pectoral muscle and its underlying tissues the intercostal muscles and the pleura. In support of this view it may be noticed that I found small nodules in and below the pectoral muscles and others attached to the periosteum of the ribs. On the other hand, these nodules were often some distance apart, and had apparently no connexion with one another, and may have been due to infection through the circulation; further, those in the parietal pleura were not more numerous underneath the position of the mammæ than elsewhere, and there was no sign of extension from the outer to the inner layer at the root of the lung.

[1] *Transactions of the Medico-Chirurgical Society of Edinburgh*, 1892, pp. 58, 59.

Moreover, the cavity of the pleura, into which the cancer cells were probably freely discharged, does not communicate with the lymphatics of the visceral layer, as is so clearly shown in an ordinary carbonaceously pigmented lung where the carbon particles are freely deposited in the lung tissue, and often abundantly in the subpleural tissue, but never in the sac itself. Quain, vol. ii., p. 503, says the lymphatics do communicate by means of stomata with the pleural cavity. The affections of the visceral from the parietal layer, which, it will be remembered, were not in the slightest degree adherent to one another, might be explained by an auto-inoculation. That such a method of inoculation is possible where surfaces constantly rub against one another is illustrated by a cancer of the posterior wall of the bladder giving rise to a secondary growth on the anterior wall. Coats[1] mentions this condition, but the whole question of the possibility of inoculation of cancer is still unsolved. Many experiments have been performed upon animals, and even upon man, but their result has hitherto been negative. The most recent experiments by D'Arcy Power[2] have so far given promise of a better issue, but in the present case the far greater extent and amount of the infiltration of the visceral as compared with that of the parietal layer would in itself contradict it even were the possibility of such an inoculation allowed. *2nd*, An extension from the peritoneum through the lymphatics and tissues of the diaphragm. I have frequently seen this method of spread, but in such cases the parietal pleura has been more especially affected. The visceral layer can only be affected by an extension first to the root of the lungs and thus to their serous covering, or by a direct invasion by the cancer cells free in the pleural cavity. *3rd*, A distribution by the blood. The cancer cells can reach the blood only by passing along the lymphatic vessels to the lymphatic glands, where they generally remain for a long period, but after a time they make their way by direct extension into the small veins of the gland, and thus reach the systemic veins. Since the lymphatic glands act as sieves, none or few of them will be allowed to pass onwards into the thoracic or right lymphatic duct, and thus into the large systemic venous trunks. They thus reach the right side of the heart and pass by the pulmonary artery to the lungs. The cancerous emboli may stick in any part of the pulmonary capillaries, and thus form secondary nodules in the lungs, but it is to be remembered that the pulmonary capillaries are wider than those in any other part of the body, and that it is therefore possible for small emboli to pass through them, and thus reaching the systemic circulation, pass to the brain or other organs, and there give rise to the phenomena of embolism or of infarction. In this

[1] *Manual of Pathology*, 1889, p. 264.
[2] *British Medical Journal*, 1893, vol. ii., p. 830.

case no nodules were observed in the lung, and the cancer cells must have passed freely through the pulmonary capillaries, a course which their very small size would certainly favour. Now, it is to be noted that the capillaries of the deeper layer of the pleura come from the bronchial arteries, and, though the two systems freely anastomose, especially around the terminations of the bronchial tubes, they are not at all likely to have received such a plentiful cancerous stream from the pulmonary capillaries. This would necessitate a transportation of the cancer cells into the pulmonary veins, and thence to the left side of the heart and systemic circulation generally, when they would pass along the bronchial arteries to their capillaries. This would explain also the cancerous condition of the bronchial glands which the bronchial arteries supply. It is quite possible that the cancerous infiltration of the visceral layer of the pleura was brought about through both these channels, and that once it gained a footing it spread rapidly by continuity and by invasion of the lymphatics to bring about the general cancerous infiltration observed in that membrane. The affection of the epicardium is probably to be explained much in the same way, although its limitation is certainly curious. These membranes, the pleura and the pericardium, especially the former, are comparatively commonly the seats of secondary cancer, while it is stated by competent authorities that primary cancer does not occur. Coats, Harris, and others, however, mention cases.

The liver is probably the commonest site of secondary cancer. It is easy to understand why this should be so, on account of its double blood supply through the hepatic artery and the portal vein; and further, on account of its close contiguity to such frequent sites of primary cancer as the stomach and pancreas. In this case the infecting cells have reached it through the medium of the hepatic artery, and the appearances presented by the diseased organ are in many respects exceptional ones. The immense number and small size of all the nodules present an unusual feature, for it is much more common to find one or more of them of much greater size than the others, and this is especially the case when the primary seat is in some contiguous organ.

The failure of any of the nodules to project beyond the capsule of the organ, so that its surfaces were quite smooth, is also an unusual occurrence, which I have met with on only a few other occasions. The change of type in the microscopic characters of the nodules is another noticeable feature. It is a general pathological law that secondary cancer growths reproduce the structure of the primary tumour, even in its more minute details. They tend to imitate them in the shape, size, and character of their cells, in the amount and arrangement of the fibrous stroma, and even in the character of the vessels. It is a law not without exceptions, as the present case illustrates, and I have seen other instances of a corresponding metamorphoses. So far as primary cancer is con-

cerned, the liver is not a common site. It is, however, not uncommonly met with, and usually presents the unusual picture of a large primary and smaller secondary and separate tumours existent in the same organ.

The spleen is the rarest organ in the body to be affected with cancer. There are a comparatively few cases on record altogether, and these are mainly in connexion with cancer of the stomach, where the disease spreads into the spleen by direct implication. I have myself seen such a condition, and also an implication of the capsule invading the substance to some extent; but I have never seen anything like the general and diffuse nodular infiltration which occurred in the present case; and so far as I have yet found, no similar case is on record. The greatly enlarged condition of the organ, with a retention of its normal shape and perfectly smooth surface, are additional rare characters. I have seen a cancerous nodule existing in the centre of a large infarction in the spleen in a case of cancer in other abdominal organs, and again in a similar case an infarction of this organ which was regarded as cancerous until microscopic examination disclosed its perfectly simple nature.

Part of Dr Russell's most careful work on the fungi (fuchsin bodies) present in cancer cells was done from a study of sections of cancerous nodules in the spleen which he observed in two separate cases. It is extremely difficult to understand why this organ is so rarely affected with secondary cancer. It may be that the periodic and constant contractions of the organ prevent the settling, and further favour the expulsion of the invading cancer cells; but against this we have to place the great frequency of the occurrence of simple infarctions, the result of the impaction of other emboli in the end arteries of the organ. It cannot be said to be due to the small size of the emboli in the case of cancer, for this would be equally efficacious in preventing the occurrence of secondary growths in all other organs except the lungs; further, we may add that in this particular case the size of the cancer cells in the spleen and elsewhere was unusually small. Perhaps some explanation may be found in the peculiar vital resistance or active destroying power on the part of the splenic tissues themselves. It is well known that many organisms are destroyed in their passage through the spleen, and many septic emboli succeed in producing only simple and not septic infarctions of the organ.

I have not been able to find any authentic record of primary cancer of the spleen. Some of the reported cases were published before the time when the distinction between cancer and sarcoma was made, and others have been recorded in provincial journals in America, which I have not been able to consult. If we accept the view generally upheld by pathologists, that cancer can take its origin only in tissues derived from the epiblast or hypoblast of embryonic life, then we must deny the possibility of the occurrence

of primary cancer in the spleen, inasmuch as it is entirely derived from the mesoblast. Its occurrence might even then, however, be accounted for by the inclusion theory of Cohnheim. The spleen is developed in the substance of the mesogastrium, apparently in the same mass of mesoblast as that in which the pancreas takes its origin, but without the hypoblastic evolution of the latter organ. It is possible to assume an inclusion of this in the separation of the spleen, and that cancer might subsequently spring from this "embryonic residue." Recently an excellent paper by Harris on "Primary Cancer of the Pleura," in the *Journal of Pathology* for November 1893, supports the contention that mesoblastic cells may under certain circumstances take on the characters of those of the epiblast or hypoblast, and thus independently give rise to cancer growth.

The lymphatic glands, while they are extremely frequently the seat of secondary cancer, are in the same position as the spleen in their relation to the primary form.

The left femur was apparently the only bone affected in this case, and the condition of the upper part of the shaft presented most unusual characters. The amount and density of the sclerosis of the whole thickness of the shaft, and its periosteal thickening in this position, were most remarkable. The lower part of the shaft, with its many separate and small cancerous nodules in the marrow, afforded a familiar enough appearance, and indicated a rapid growth totally unlike that of the upper part, which was of a chronic character, and must have been of some standing. The clinical history states that for a month prior to the patient's admission to the hospital, *i.e.*, five months prior to her death, she had been unable to walk without assistance, owing to the pain in the left hip and thigh. The pathological appearances of the upper part of the bone quite warrant this age being put upon them. The frequent affection of the bone marrow by secondary cancer is curious when the close resemblance between its structure and that of the spleen is considered. Besides the bone marrow it often occurs in the cancellous tissue of the ends of the bones, of the ribs, and of the vertebræ. Erichsen gives four cases occurring after excision of the breast, and I have seen it occur also in cancer of the stomach. Primary cancer is reported by several careful observers to take its origin in bone, and quite a number of such cases are recorded; however, as bone does not contain any epithelial cells, we are met with the same difficulty as in the spleen and lymphatic glands. It may, however, be practically primary in the jaws.

Secondary cancer of the suprarenals is not uncommon. It is most often seen as a single nodular mass occupying a considerable part of the organ, with smaller nodules in its neighbourhood, and arises by direct extension from the stomach, pancreas, etc., or by secondary or tertiary infection. Primary cancer is rare. I have

seen one instance of a very large tumour of this nature, a malignant adenoma.

Secondary cancer of the kidney is also not uncommon, and generally arises through a tertiary infection. Primary cancer is rare, and when it does occur is most frequently of the encephaloid type. I have met with instances of it, of scirrhus, and of the malignant adenoma.

Secondary cancer of the stomach is extremely rare, while the primary form is equally common. Secondary cancer of the ovaries is comparatively common following upon the disease in the uterus and other parts, and is generally double, as in the present case. Primary cancer is not common.

The condition of the dura mater is a most curious and interesting one. It is rare to find secondary cancer affecting the membranes of the brain or the brain itself, and when it does so it is usually associated with the disease in the cranial bones. I have seen one such case follow cancer of the stomach. It is further interesting to find the pia-arachnoid quite free, although from the extensive infiltration of the dura-arachnoid there must have been a plentiful distribution of cancer cells in the subdural space. Primary cancer of the dura-arachnoid has been described, being of the nature of an endothelioma arising from the arachnoid layer. It is rare.

A general consideration of the distribution of the cancer in this case excellently exemplifies the belief that the sites commonly affected by secondary cancer are rarely affected by the primary disease, and *vice versa*, for the breast, cervix uteri, stomach, rectum, the lips, tongue, testis, skin, penis, prostate, bladder, and œsophagus, are favourite seats of primary cancer, and in many of these secondary deposit is unknown, and in all of them it is of very rare occurrence.

Dr Stiles said he had examined the patient's mammæ with Dr Bramwell last February, when the disease was not far advanced, and he had come to the conclusion that the condition was one of carcinoma. The case was certainly peculiar. He had not seen a similar one before. There were multiple nodules throughout both mammæ. When one met with a condition like this, especially in an unmarried woman, one thought of chronic lobular mastitis with small cysts rather than cancer. But there were beaded chains radiating in all directions from the mammæ, and in the axillæ there were very hard glands. He had removed one of the nodules, and found it to show the structure of carcinoma, but the cells were smaller than usual. He had also examined the mammæ after death, and prepared naked-eye specimens by the nitric acid method, which showed the nodules, and also a fibroma. This probably was the tumour which was felt some years before. The large number of nodules in the mammæ were to be explained in one of two ways. Either one of them was primary and the others

had arisen from it by dissemination, or it was a case in which the tumours were multiple from the first. The nodules in the front of the abdomen and in the back were to be explained by the opening up of their lymphatics when the usual lymphatic channels from the mammæ became obstructed. He thought that the tumours in the internal organs could only be accounted for by a blood distribution.

Dr Alexander Bruce said he would like to express his astonishment at the condition of the spleen. It was certainly, as Dr Bramwell had said, an exceedingly rare thing to see cancer of the spleen at all. When it did occur it was usually an infiltration from the neighbouring organs, from the stomach towards the hilum. This was an almost perfectly unique case. He had never seen anything like it, and there was nothing in the ordinary text-books about it. The infection of the liver and spleen was more likely to be embolic than lymphatic in its spread. It was certainly possible that the dura mater of the spinal cord and brain might be involved from the lymphatic side as well as from the vascular. The infection might have run along the lymphatics of the intercostal nerves, and have entered into the spinal canal through the intervertebral foramina. Then the cancer cells might have passed up through the lymphatics of the dura mater. There was little doubt that tubercular meningitis frequently arose in a similar way from a focus of infection about the spine. With regard to the absence of pigmentation of the skin in this case, it was his experience that Addison's disease was never produced by tumours of the suprarenal capsules, but only by tubercular degeneration of them.

Dr William Russell said, as the condition of the spleen had aroused interest, he might say that he had had one case of diffuse cancer in that organ, and in which there were, so far as he could remember, multiple skin cancers. He agreed with the remarks of Dr Bruce regarding the points to which he had referred. Tubercular meningitis, in his experience, was commonly associated with tubercular eruption in the membranes of the cord, and the presence of a primary caseous focus in the thorax or abdomen in some of these cases had been observed, the infection spreading first to the spinal meninges. There was no doubt that it was true that even entire destruction of the suprarenal capsules by malignant disease was not associated with any discoloration of the skin.

Dr Byrom Bramwell, in replying, said that his reference to Addison's disease had perhaps given rise to some misunderstanding. His experience on the point entirely corroborated that of Dr Russell and Dr Bruce. In this case, however, there had been dense infiltration around the suprarenal capsules, which might have compressed the nerves, which it was probable were affected in tubercular disease of the suprarenals. With regard to tubercular processes in the membranes of the brain and spinal cord, he thought that the condition in the cord when it occurred was

usually trifling in comparison with that in the brain. He did not think that tubercular meningitis was usually an extension from a spinal meningitis. Dr Stiles' suggestion that in this case the cancerous cells got into the blood and produced embolic infections in the various organs was almost certainly true. It was, however, difficult to understand how the cancer cells got into the blood, and how they could pass through the lung without producing tumours there. He had seen innumerable small abscesses in the lung resulting from an abscess in connexion with the liver, and he did not know that the infective particles in the case of an abscess were more likely to stick in the lung than those in the case of cancer.

Dr Alexander Bruce remarked that melanotic sarcomas beginning in the orbit frequently occurred secondarily in the liver without occurring in the lung. In such a case the cells must have been passed through the lung. Probably the reason that the lung was not involved was that the pulmonary capillaries were very large, and therefore enabled cells which stuck in other capillaries to pass through them. In head injuries with a septic consequence there was very frequently abscess in the liver, though the lung escaped.

Dr Leith explained that in his pathological report he had not meant to convey the impression that he believed that in this case the spread of the infection was by means of the lymphatics. He merely meant to dwell on the curious condition that in the internal organs there were lymphatic injections. His explanation was the same as that of Dr Stiles. He agreed with Dr Bruce regarding the great likelihood of cancer cells passing through the lungs without lodging there.

Meeting V.—February 7, 1894.

Dr Clouston, *President, in the Chair.*

I. Election of Members.

The following gentlemen were elected Ordinary Members of the Society:—Claude B. Ker, M.B., C.M., Viewfield, Crieff; William Craig, M.B., C.M., Foulford House, Cowdenbeath, Fife.

II. Discussion on Intra-cranial Surgery.

The President made some introductory remarks, after which *Prof. Annandale* opened the discussion from the surgical aspect by reading the following paper:—

When I was honoured by being asked to open the discussion on Intra-cranial Surgery I accepted the invitation with the under-

standing that the discussion was to be practical, and as much as possible upon the results of individual experience.

The subject is a wide one, and I feel sure that I shall have the sympathy of my audience in my endeavour to be concise. Feeling the importance of arrangement, certain heads were submitted to the President and Council, who were good enough to approve of them and to make one or two slight additions.

Intra-cranial surgery has made marked advances in recent years. Antiseptic surgery has rendered operative procedures upon the skull and its contents comparatively safe. Brain localization has made diagnosis more accurate, and electric tests have still further assisted the surgeon in confirming the correctness of his localization. We have, however, still much to learn in regard to intra-cranial affections and their treatment, and such knowledge can be acquired only by continued research and observations—physiological, pathological, and clinical—and also by carefully considered and carefully executed exploratory operations. It is now nineteen years since I strongly advocated, in a paper published in the *Edinburgh Medical Journal* for 1875, "Antiseptic Incisions as an Aid to Surgical Diagnosis," and now this practice is acknowledged to be of the greatest value in obscure conditions affecting many important regions and cavities of the body. The cavity of the cranium has not as yet been so freely treated upon this principle as other cavities, but I believe that in the future, surgeons will explore this cavity more frequently.

I.—*For Exploratory or Diagnostic Purposes.*

It has usually been a recognised principle that the cranial cavity should not be opened into by the surgeon unless the history or special symptoms of the case pointed to some condition which experience has shown may be remediable by such procedure, but I am of opinion that in certain cases the surgeon is justified in departing from this principle, and operating when such guides do not exist. I would specially refer to—

1. Cases presenting symptoms of general brain pressure unrelieved by ordinary treatment, and of doubtful origin. More than twenty years ago I opened the skull of a patient in Prof. G. Stewart's wards in the Old Infirmary. The patient's symptoms were those of general brain pressure, and although no special condition was found, temporary relief was marked. Another case of this kind was operated upon by Sir Joseph Lister in the same wards with success.

2. Cases in which the symptoms are constant and severe pain in the head, unrelieved by any treatment, and difficult to distinguish from that depending upon intra-cranial causes. In some of these cases there may be the history of an injury or of specific disease, but no external manifestations can be detected. In illustration I

give brief notes of the case of J. A., æt. 55. Twelve years before he consulted me he received a blow upon the top of his head, and ever since, but more particularly for the last two years, he had suffered from intense headache, referred to the upper and back part of his head. No specific history could be obtained, and there were no external conditions to be detected. He had tried many remedies, internal and external, without any relief, and was depressed and melancholic. Upon the 18th of February 1889 I removed a circle of bone from the upper and posterior aspect of the right parietal bone, the seat of injury, by means of a one-inch diameter trephine. No abnormal condition was found, although I incised the dura mater. He made an excellent recovery, and was dismissed perfectly cured upon the 6th of March. Although no advocate of indiscriminate operations, I am of opinion that surgical interference should be carried out in any doubtful cases under these heads, when they have resisted careful medical treatment. If the skull is opened with proper antiseptic precautions, the operation itself is not attended with much risk to life. If no abnormal condition is found after removing the circle of bone, the dura mater should be carefully incised, and the brain substance also if the membrane is found healthy. Such exploratory operations cannot always be successful, but as the condition of the patient is, as a rule, hopeless, such an operation may give a chance of affording relief.

II.—*Intra-cranial Inflammation and Suppuration.*

(*a.*) *Traumatic.*—In any case of injury to the skull, with or without a fracture of the bone, inflammation and suppuration may result. Intra-cranial suppuration following scalp wounds or bruises without fracture is now not common, principally owing to the absence of septic conditions; but in my early surgical experience, before the days of antiseptics, it was not uncommon to find such injury followed by inflammation and suppuration in connexion with the bone and its diploe, and intra-cranial suppuration. In illustration I give a brief note of the case of B. H., æt. 11, who, in May 1889, received a wound on the scalp over the upper and left side of the head at a point corresponding to the motor area of the arm. There was no fracture, but suppuration took place in the soft textures of the scalp, and this was shortly after followed by severe epileptic fits which occurred many times daily, and which commenced by severe twitching in the right arm. Upon the 24th of June the wound was enlarged and a necrosed portion of the outer table of the skull was exposed; the trephine was applied so as to include the necrosed portion, and a circle of bone removed. Immediately a gush of pus took place, the abscess being situated between the dura mater and the bone. The result was a complete success, and the patient, when seen three years after, had had no return of the fits.

In any case of injury to the skull the inflammation may be diffuse or circumscribed. In the former the symptoms will usually be those of general brain pressure or irritation; in the latter there may or may not be localized symptoms, which will be a guide to the position of the abscess.

When localized symptoms exist, the surgeon should have no hesitation in trephining accordingly; but when the symptoms are only general, the hope of relief following operation cannot be so good. Still, opening the skull may in some such cases give relief; and when considering the propriety of operative interference the surgeon should study the nature of the accident, and keep in view the fact that the suppuration may in some instances take place at a point opposite to the seat of the injury. My experience in connexion with intra-cranial abscesses leads me to express the opinion that in all cases in which the symptoms are severe and persistent it is the duty of the surgeon to explore as thoroughly as possible both cerebrum and cerebellum, even if repeated openings require to be made in the cranial walls.

(*b.*) *Middle-Ear Disease.*—As Dr M'Bride is to speak from his experience upon this cause of intra-cranial suppuration, I will content myself with emphasizing, as a result of my own experience, the following opinions:—

1. Patients suffering from chronic suppuration of the ear are liable to certain risks.

2. That these risks consist of suppuration, which may be associated with necrosis, may involve the mastoid cells, may lead to accumulations of pus in the mastoid antrum, to intra-cranial inflammation and suppuration, and occasionally to thrombosis of the lateral or other sinus and the internal jugular vein.

3. That when intra-cranial suppuration takes place it may be diffuse or circumscribed, may be external to the dura mater, or may occur—1*st*, in the temporo-sphenoidal lobe (most common); 2*nd*, in the cerebellum; 3*rd*, more rarely in the opposite hemisphere or other lobes, and sometimes in the pons or crus.

4. That localized brain symptoms are not usually present, so that the diagnosis must depend upon the history of the case and *general* brain and other symptoms.

5. That in all such cases it is important that free exit be given to pus, and that the exact operative procedure will depend upon the symptoms. If there are signs of involvement of the mastoid cells or antrum, these should be freely opened into; and if there are any brain symptoms, the skull should at once be opened, and the cerebrum, and if necessary the cerebellum, carefully explored for suppuration, always keeping in view the fact that the exact seat of the abscess is not easily determined without such exploration.

In illustration of a cerebellar abscess I give a note of the following case:—R. W., æt. 15, admitted July 8th, 1887, with a

history of suppurating middle-ear disease for several years. When admitted he had general brain symptoms, but no localized ones. The skull was opened so as to expose the temporo-sphenoidal lobe. No suppuration was found after careful exploration by fine trocar and canula. Patient died suddenly the same evening, and the post-mortem revealed an abscess in the cerebellum.

In illustration of the risk in delaying the operation I record the case of A. B., æt. 36, admitted October 3rd, 1890. He had suffered for many years from chronic suppuration of the middle ear, and when admitted he had general brain symptoms, and also symptoms of general infection. When the skull was trephined, 8 ounces of very putrid pus were evacuated from an abscess over the temporo-sphenoidal lobe; great relief followed, but he died from secondary lung affection two weeks after.

(*c.*) *Idiopathic.*—Suppuration, diffuse or in the form of abscess, may result from tubercular disease or from secondary infective causes in connexion with local affections. Such suppuration may result in *general* or *localized* symptoms. If the symptoms are localized, the duty of the surgeon is to operate, guided by them. If the symptoms are more general and unrelieved by medical treatment, an exploratory opening should be made at some point where no important intra-cranial vessel or sinus is likely to be injured; and if the suppuration is discovered, a second or counter-opening should, if necessary, be also made.

In connexion with abscesses of the brain from all causes I would remark,—Brain abscesses are (1) most common in the white matter of the brain; (2), they may occur between the bone and dura mater; (3), they do sometimes exist for a considerable time without giving rise to marked symptoms, and yet serious symptoms may occur suddenly by rapid extension, or by bursting cause death; (4), that they may be either well circumscribed or more or less diffused, with softening of the brain tissue round them.

III.—*Hæmorrhage.*

(*a.*) *Traumatic.*—Intra-cranial hæmorrhage may be the result of any injury to the skull with or without fracture or perforation of the bones by a foreign body. The source of such hæmorrhage may be the rupture or wound of bloodvessels external to or in connexion with the membranes or of the vessels of the brain itself, as shown in the following case:—

A young soldier belonging to a Highland regiment stationed in the Castle was "larking" with some comrades. One of them had in his hand an old umbrella, with which he made a fencing pass at the patient. The umbrella stuck to the man's head and required a little force to detach it. Shortly after, the patient became faint, and was laid upon his bed and whisky administered to him. Some hours after, as he was showing signs of unconsciousness, his case

was reported, and the medical officer in charge saw him and ordered his removal to the Infirmary. When admitted he had all the signs of compression of the brain, but no signs of fracture. He never rallied, but died some hours after admission. At the post-mortem it was found that the point of one of the spars of the umbrella had penetrated the vault of the skull, causing a small punctured wound the size of a crow quill, and had opened a branch of the middle cerebral artery, and caused extensive effusion of blood in the cranium. The skull was a thick one.

In cases where the symptoms are localized the procedure of the surgeon is quite clear, and that is to trephine over the part indicated and endeavour to remove clot and stop hæmorrhage. When the symptoms are more general, an opening into the skull may be useful in relieving pressure, and may also be useful in removing the blood which is causing pressure. The trephine should first be applied over the part injured, and if no clot is found there, the point opposite should be explored. Even in fractures involving the base of the skull, opening the cavity ought to be more frequently resorted to when the symptoms of compression remain unrelieved. A study of the exact nature of the accident and of the symptoms present will, as a rule, guide the surgeon to the special portion of the base of the skull involved in the fracture, and will so aid him as to the seat of the operation. In all injuries of the skull it may be noted that operative interference may be useful, not only in removing blood-clot or assisting the temporary removal of brain pressure, and so allowing time for the blood to be absorbed, but it may also give exit to the increased amount of cerebro-spinal fluid, which undoubtedly may act as a cause of brain pressure should it not be able to escape, as in cases where the injury communicates externally through the ear. The operation of Hartley, which exposes the Gasserian ganglion of the 5th cranial nerve inside the skull, has now been performed successfully in several cases, and some similar operation might be employed to remove clot or pressure from the base of the brain.

(*b.*) *Non-Traumatic.*—Hæmorrhage of a non-traumatic origin may be the result of a rupture of any vessel inside the cranium, but the most common sources of such hæmorrhage are from the anterior, middle (most common), and posterior cerebral arteries, and their branches. Any such hæmorrhage may prove rapidly fatal, owing to its amount or to its causing pressure upon special portions of the brain, but there is a not uncommon class of case in which the condition is not speedily fatal, and in which the symptoms of general brain pressure or of localized pressure continue. In the latter, surgeons should have no hesitation in operating with the hope of removing the compressing clot; and in the former, would it not be both wise and justifiable to operate with the view of relieving, even temporarily, general pressure in cases which after a reasonable interval show no signs of improvement? Post-

mortem examinations have taught us how Nature will in time absorb collections of blood, the result of idiopathic hæmorrhage; and is it not reasonable to suppose that in some, at least, of fatal cases of such hæmorrhage, an operation, by relieving general pressure, would give Nature time to get rid of the compressing agent? The physician should seek the aid of the surgeon under such circumstances, and it will be the duty of the surgeon to open the cranium with every careful antiseptic precaution. Should there be any special guide to the situation of the hæmorrhage, the operation should be performed with a view of reaching this point; but if the symptoms are only general, a free removal of the skull wall with the object of relieving general brain pressure will be indicated. I am not prepared to advise that in these latter cases the brain itself should be much interfered with. All I suggest is that the general pressure should be relieved with the hope that clot may be absorbed. Here it may very properly be asked, At what point should the surgeon open the cranial cavity with a view of relieving general brain pressure? To this I would answer, on any portion of the vault where a free opening can be made without injury to sinuses or intra-cranial vessels, for it has been experimentally shown that pressure upon the upper surface of the brain causes the greatest amount of intra-cranial arterial tension.

IV.—*Epilepsy.*

(*a.*) *Traumatic.*—Injuries may give rise to epilepsy from primary or secondary causes,—the *primary* causes are foreign bodies, portions of the skull bones, clots of blood, or laceration of brain substance, producing pressure and irritation. But epilepsy is more frequently due to secondary causes, the chief of which are:—(1), The irritation of portions of depressed or displaced bone, which may not at first have caused symptoms; (2), the irritation caused by chronic inflammatory thickening of the bone or membranes, or by the formation of new bone, usually in the form of a spicula or spiculæ; (3), irritation, the result of suppuration; (4), irritation, the result of extravasation of blood occurring in the form of a blood cyst; (5), occasionally the irritation caused by the presence of some foreign body.

In the great majority of these cases there will be—to guide to the source of the irritation—(1), The history of the particular accident; (2), some external signs of the accident; (3), some localized symptoms.

Naturally the essential treatment of such cases is to get rid of the source of irritation, as has already been illustrated in the case of the girl suffering from necrosis of the skull bone, and abscess, the result of a scalp wound. In further illustration I record the case of W. W., æt. 55, who suffered from epileptic fits, which he attributed to a severe blow upon his head from a hammer twenty-

five years before his admission. The fits had been steadily increasing in number, and were accompanied by some weakness of the left arm. I trephined over the motor area upon the right side of the skull, and found a large cyst, which was freely opened into. The wound of the operation healed rapidly, and the patient was much relieved, the epileptic fits being much reduced in number, but I have since learned that the fits have resumed. My experience would lead me to advise that such cysts should be for a time thoroughly drained; for unless this is done and the cavity of the cyst obliterated, the cyst will continue to secrete, and the conditions of pressure or irritation are not permanently relieved.

In all cases of traumatic epilepsy the result of primary or secondary causes, it must be remembered that degeneration or changes in the brain tissue may prevent the success of surgical procedure, even if the apparent irritation is removed.

(*b.*) *Syphilitic.*—As syphilis most frequently attacks the cortical substance of the brain, the occurrence of epilepsy in such cases is explained. Localized symptoms may or may not be present, but one peculiarity of this form of epilepsy is that the brain condition does not remain *in statu quo*, but continues, in the large majority of cases, to become sooner or later worse, to involve more of the brain structure, and result in more and more mental aggravation.

My own experience of syphilitic affections of the brain is that although a few, and more particularly if early treated, may recover, the majority steadily, and more or less rapidly, become worse, and die from the disease in spite of all careful medical treatment. Unless, therefore, localized symptoms—which have resisted anti-syphilitic treatment—are present, I cannot advise operative proceedings in this class of case.

(*c.*) *Developmental and Idiopathic.*—In considering the question of operative interference in brain conditions occurring during the developmental period, a careful study of the causes which may produce epilepsy or other brain disturbances may be useful. Briefly stated, these causes may be classed under—(1.) Traumatic causes, such as injuries inflicted during birth, or in infancy or early childhood; these injuries resulting in intra-cranial hæmorrhages or in inflammatory thickenings, and consequent pressure upon the brain, which may or may not be followed by changes in its substance. (2.) Inflammatory conditions, originating in the brain tissue or its membranes, and resulting in alteration in the brain tissue. (3.) Some arrest or alteration in connexion with the development of portions of the brain. (4.) In connexion with the two first causes one or more intra-cranial cysts may form, or collections of fluid may accumulate in the ventricles, causing hydrocephalus, and be an additional source of brain pressure. (5.) In the majority of cases depending upon these various causes the special change in the brain substance is an atrophy accompanied by sclerosis.

The portion or portions of the brain affected by one or more of these causes (for more than one cause may be present) will influence the particular symptoms or group of symptoms which are present in the variety of cases met with.

The symptoms in such cases may be classed under—(1), Varying types of paralysis; (2), mental deficiency, varying much in character and degree; (3), sensory alterations, also varying in their nature.

In all classes of case, epilepsy is common, and the fits vary much in degree and intensity.

From a consideration of the facts referred to it is evident that operative interference in cases in which the brain tissue has become permanently altered (atrophied and sclerosed) or absorbed by pressure cannot be satisfactory; but, on the other hand, operative experience in connexion with these cases has already proved that some of them may be more or less improved. As, however, the diagnosis of the exact brain condition is not easily made, such operations must be classed under the head of exploratory procedures.

Epilepsy, hemiplegia, and sensory defects, in these conditions, have been relieved by operation; and should a cause, such as a clot, tumour, thickened membrane, or cyst be met with and removed, a favourable result might be expected if the brain tissue has not undergone much permanent change.

In patients whose brains have reached their full developmental period, epilepsy (idiopathic) may result from any intra-cranial disease. If localized symptoms exist, the surgeon has no hesitation in exposing the special brain region and removing, if possible, any cause which may be producing the fits; but operations performed for epilepsy in which there are no special symptoms are not to be so lightly undertaken. At the same time, if the fits are constant, and unrelieved by other means, an exploratory opening of the skull might in cases otherwise favourable be justifiable.

It is likely that a certain proportion of what are supposed to be idiopathic cases are really the result of traumatic causes. Externally there may be no signs of injury, and the patient may have no recollection of having sustained an injury, but still the skull may have received an injury. It is therefore advisable that very careful examination—the head having previously been shaved—should be made, and searching inquiry instituted as to the possibility of an accident.

In idiopathic epilepsy with distinct localized symptoms operative interference is not always successful. This may be owing to the fact that the whole *local* cause is not removed or cannot be removed at the time of the operation. The excision of the portion of the brain apparently at fault has been practised in cases in which no good results have followed the opening of the skull and incision of the dura mater. In connexion with such

excision of brain substance it is to be noted that such a procedure is not always followed by a cure, and also that it may lead to paralysis of the parts connected with this portion of the brain. At the same time, if the epilepsy is aggravated, such an operation is justifiable. A second operation has succeeded. I record in illustration the case of G. L., æt. 23, who in 1890 was admitted into Professor G. Stewart's wards suffering from Jacksonian epilepsy. He began to suffer from slight dizziness, coming on without warning. Six weeks after, he began to feel pricking sensations, commencing in right side of his head and passing down his right arm, right side of trunk, and right leg. Eighteen months after, he first had a fit, in which he became unconscious, and since then he suffered from numerous epileptic fits, commencing with same sensations in the right arm.

On 20th January 1893 I trephined, at the request of Professor G. Stewart, over the left motor area. A cyst was found and was evacuated. For the first few weeks after the operation the fits entirely ceased, but after this again returned, and they still continue. In this case I advise a second operation, and if the cyst still remains it will be drained. If no cyst be present, I would suggest a freer removal of the bone upon the left side over the motor area, and the application of electric test and excision of motor area if diagnosis is confirmed.

V.—*Intra-Cranial Tumours.*

The presence of a growth inside the skull sooner or later gives rise to symptoms the nature of which depend—1*st*, Upon the position of the tumour; 2*nd*, upon the amount of brain pressure which it is causing; and, 3*rd*, upon the presence of hæmorrhage or effusion caused by the tumour. The exact diagnosis of the presence of an intra-cranial growth cannot always be made, for other conditions, such as tubercle, chronic abscess, syphilitic deposits, and collections of fluid may give rise to very similar symptoms. The most marked symptoms of an intra-cranial growth are those of pain in the head, giddiness, vomiting, optic neuritis, epilepsy, mental irregularities, and in some cases special localized symptoms which will point to the position of the growth. All these symptoms may not be present. Further, the symptoms are usually steadily and more or less rapidly progressive, and are permanently unrelieved by any ordinary treatment. I say permanently, because it occasionally happens that medical treatment temporarily relieves symptoms.

Experience in connexion with intra-cranial growths has proved —(1.) That there is in some cases an uncertainty in regard to the exact diagnosis of the case. (2.) That although localized symptoms may point to its position, the nature of the tumour and its exact connexion can only be accurately determined by means of an explora-

tory operation. (3.) That if the tumour is circumscribed and can be removed, the result is likely to be satisfactory, more particularly when the growth belongs to the group of tumours in which malignant tendencies are slight. (4.) That when no localized symptoms exist, an exploratory operation may be performed in cases which point to the presence of an intra-cranial growth, provided that the symptoms have been unrelieved by a short course of general and of special treatment, should there be any syphilitic or tubercular suspicion. The tumour may not admit of being removed, but experience has shown that in some of these cases the operation has been useful in taking off general pressure, and has even, in a few instances, been followed by shrinking or degeneration of the growth. Again, a growth may give rise to effusion of fluid or to hæmorrhage, and the symptoms caused by these conditions may be at least temporarily removed by the operation.

The following case is interesting as illustrating the successful removal of a large intra-cranial tumour, the patient remaining well three years after:—

A. A., aged 43, admitted March 24, 1891. Patient had suffered for about nine months from pain in his head, and gradually increasing loss of power in left arm and leg. There was a history of several injuries to the head. Fell about 16 feet on to his head some years ago, and got concussion of the brain. Had a good many more knocks about the head, but none have left any mark. No history of syphilis; left leg and arm very much weaker than right, almost paralyzed; has twitchings on left side of face; double optic neuritis, more marked on left side; at times slight loss of memory for certain words; dizziness and a "bizzing" in his head. On *March 25th*, 1891, I trephined over motor area for left arm. On removing disc of bone it was observed that there was no brain impulse. Membranes did not bulge. Incised dura, and found that the brain tissue was replaced by a new growth. Tumour was well defined, and so large that the opening in it had to be increased, although the trephine used was an inch and a quarter in diameter. The tumour was then enucleated with the fingers, and brought out in two pieces with the aid of a curved periosteum elevator. The tumour, which was the size of a tennis ball, presented the naked-eye appearances of a sarcoma. The opening in the membranes was stitched up to a certain extent, and a large-sized rubber drainage-tube was inserted into the cavity, and stitched to the skin. There was a good deal of oozing from the cavity, and the wound had to be dressed same night. After the patient had recovered from the effects of the chloroform, it was noticed that his left arm was paralyzed, but he appeared very well otherwise. On the *26th*, patient said that his head felt better than it has done for a very long time. Temperature normal. *29th*.—Wound has been dressed every day. Fair amount of discharge, apparently broken-down blood-clot. Temperature keeps normal. Power in

left arm is returning. He can lift his arm from the bed to-day. 30*th.*—Dressed wound and removed tube. 31*st.*—Power in muscles of forearm is returning. Since tube removed, slight protrusion, either of brain or blood-clot, through wound. *April* 5*th.*—Steadily improving. Protrusion rather smaller. 25*th.*—Allowed to get up and walk about ward. Gaining strength rapidly. Protrusion nearly flush with skin now. 30*th.*—Is walking better now than he was able to do for some time before operation. Arm and leg went on improving steadily, gaining strength every day, and patient was sent to Convalescent House on 21st May.

Pathologist reports that tumour is a glio-sarcoma.

Feb. 13*th*, 1894.—Patient continues quite well, and has a good use of his arm and leg.

VI.—*Microcephalus and Hydrocephalus.*

The removal of portions of the bones of the skull in cases of microcephalus, with a view of allowing a brain arrested in development to expand and develop, has already been followed by fair success, and if practised before the age at which brain development ceases, may, in some cases at least, lead to a mental improvement.

Hydrocephalus.—Operative treatment in this condition has proved to be very unsatisfactory. I have tapped such cases on several occasions, and applied elastic pressure, but with little permanent benefit. As a rule, the surgeon does not interfere in these cases until the condition is aggravated, the collection of fluid large, and the brain tissue destroyed or atrophied. Is it not possible that an operation earlier in the progress of the disease might in some cases be more suggestive? The operation should be one of opening into the skull and careful drainage. I offer this as a suggestion, for I think it possible that in some cases a good result might be obtained should the brain substance not be seriously affected by some unremovable cause or destroyed by pressure.

VII.—*Mental Conditions.*

(*a.*) *Traumatic.*—It has been calculated that about 2 per cent. cases of insanity are the result of injury, and I would mention the following facts in connexion with this condition:—

1. The mental condition may show itself immediately after the injury, or at a more remote period.

2. The most common forms of mental condition are those of mania and dementia, with or without homicidal or suicidal tendencies.

The skull has been opened in a few cases of this kind with some success, and this class of case comes, in my opinion, under the head of justifiable exploratory operations, provided the exact site

of the injury can be determined. It seems advisable in such cases to make the opening free, and to carefully search for any depressed bone, for any thickening or new growth of bone, or for any thickening or adhesion of the membranes. The possibility of a blood cyst or clot must also be kept in view, for the presence of these latter may not necessarily give rise to special symptoms of local or general pressure.

(*b.*) *General Paralysis.*—Although there is some difference of opinion as to the exact pathology of this affection, there can, I think, be no doubt that sooner or later serious changes or degenerations take place in the cortex substance of the brain. Hitherto operations performed for the relief of this condition have not been successful in causing permanent improvement, but this condition also comes under the head of justifiable exploratory procedure,—only, however, to be undertaken after a careful consideration founded upon an increased knowledge of the pathology of the disease.

(*c.*) *General.*—Unless in cases where localized symptoms are present, or in which general brain pressure symptoms are marked, I do not think that our present knowledge entitles the surgeon to interfere in ordinary cases of insanity. It is quite possible that further research may produce facts which point to possible removal of causes acting upon the mind, but meantime I am not prepared to advise even exploratory proceedings in cases of general insanity, unless some such symptoms as I have referred to exist.

In conclusion, it has been impossible for me, in the time at my disposal, to refer to many facts and details in connexion with this important subject, but I have endeavoured to suggest some facts, resolutions, and experiences, which I hope may be found an assistance in indicating and limiting the lines of the discussion.

I have thought it advisable not to give quotations from or references to authorities, because if I had done so my address would have been much lengthened; but I desire to express my indebtedness to those distinguished gentlemen whose writings, researches, and experiences in connexion with intra-cranial departments entitle them to take a high position as authorities in connexion with the subject.

My views as to intra-cranial surgical procedures may to some appear too enthusiastic, but let us hope that brain surgery will not stand still, but will continue to advance. Let me add a word of caution, and it is this—that no new surgical procedures should be practised unless they are founded upon careful consideration, and upon a careful study of all new facts—pathological, physiological, psychological, and clinical. If the surgeon acts upon this principle, he will maintain the reputation of his science; and whether his procedure is successful or not, he will be able

to feel that he has been justified in his attempts to add to our knowledge of the treatment of disease.

Prof. Grainger Stewart said he thought that the best thing for him to do in opening the discussion from the medical side would be to give an account of some of the cerebral cases he had had in which he had thought it necessary to ask the aid of his surgical colleagues, and then to sum up his own experience. The first case of the kind in which he had asked the surgeon to interfere was that of a man who, about twenty years ago, was under his care in the Old Infirmary. This patient while at his work sustained a severe blow on the vertex, from the fall of a barrel in a brewery in which he worked. This partially stunned him for a short time. Soon afterwards he began to exhibit distressing symptoms. He had headache of a very severe and persistent kind, and he began to take epileptic seizures of the most pronounced type. His eyesight became dim, and it was found that he had optic neuritis. Seeing that there was a history of injury to the skull at a definite spot, he considered it desirable to try the effect of operation. Sir Joseph Lister was called in to operate. He cut down where there was a slight depression of the skull. In the course of trephining the superior longitudinal sinus was accidentally opened into, and a gush of blood took place. The circlet of bone was turned out as quickly as possible, and the opening stuffed with little pieces of carbolized catgut. The loss of blood was considerable, but from this the patient soon recovered; and he never again complained of headache, although he lived for two years afterwards. He had no further epileptic seizures, and his sight improved to such an extent that he was able to read the time on the Tron Church clock from the Old Infirmary with perfect accuracy, while the ophthalmoscopic appearances correspondingly changed. Nothing could have been more satisfactory than the result of the operation. The patient, however, suffered from cardiac disease, from which he died two years after the operation. At the post-mortem there was found some adhesion at the point where the opening had been made into the sinus, but throughout the rest of the brain there was nothing abnormal whatever. It was suggested that the good result in this case was due to the copious bloodletting from the superior longitudinal sinus, but he attached no importance to it. It was at least certain that the operation had been followed by great benefit, and he thought it probable at the time that this was due to relief of excessive intra-cranial pressure. He therefore became enthusiastic about the relief of tension in the skull in such cases by operative interference. Not long afterwards he had a patient who was suffering from a tumour in the neighbourhood of the cerebellum. The man's sufferings were excruciating, and he resolved to try to give him relief by trephining. The result was that he obtained considerable relief in so far as the headache

was concerned. The cerebellar tumour, however, of course continued to grow, and from this the man died not long afterwards. About the same time he had a case in which there had been meningitis. The circumstances of the case led him to conclude that it would be wise to trephine on the chance of being able to get rid of some pus from the brain, and so perhaps to relieve the patient's sufferings, which were very great. The operation was performed, but with no benefit. The case was one of advanced meningitis, and one of a kind in which he would not now recommend operative treatment. Another case in which he had tried trephining in order to relieve intra-cranial pressure was one in which there was a gliomatous tumour of considerable size in one of the hemispheres. All the benefit, however, they could claim from the operation was a few days' relief from the pain. Another case was that of a man who had some paralysis of one leg and arm, and also aphasia. Prof. Annandale cut down in the position to which from the symptoms they were able to localize the lesion. On introducing the finger into the trephine opening a soft velvety surface was felt, which made it clear that they had to do with a pachymeningitis. When the patient came out of the chloroform he began to speak, and could stand and walk. The effect of the operation in relieving the pressure was admirable, but there was a subsequent extension of the meningitis, and the patient died in a few days. The next case was that of a man who, on account of his personal appearance, was well known among the students by the name of "Socrates." Some years before he came under observation he had been struck by a hammer behind the ear, and afterwards became epileptic. At his own request he was trephined by Prof. Annandale over the seat of the injury. A cyst was found, the contents of which were evacuated and the wound allowed to close. The patient, however, was not materially benefited by the operation.

Prof. Annandale remarked that he was more and more convinced that these collections of fluid, diffuse or in cysts, should be drained.

Prof. Grainger Stewart, continuing, said the next case he had to refer to was that of a coachman who suffered from troublesome and continuous epileptic fits. An operation was tried in what seemed the most likely position of the lesion, but without good result. Another case was one which had been mentioned by Prof. Annandale, and which had been operated upon by him with brilliant success. A tumour of considerable size was removed. This case, along with another, formed the subject of an admirable clinical lecture published by Dr Gibson in the *International Clinics*. The outstanding symptoms were headache, double optic neuritis, paralysis of one hand and forearm, with paresis of the corresponding leg, impairment of memory, and loss of self-control. The patient, after much persuasion, consented

to operative interference. The affected areas were cut down upon, and the tumour removed. The most marked improvement followed. The patient was able to walk long distances, could use his hands comparatively well, and was able for a certain amount of work. In a similar case on which Mr Alexis Thomson operated, the tumour was found to be deep-seated and could not be removed. A very remarkable case was one in which Mr Hodsdon had operated for him. The patient was a young woman who had thrombosis of the superior longitudinal sinus, which extended. She became aphasic, and suffered from seizures of Jacksonian epilepsy. The case turned out to be an absolutely hopeless one. There was found to be extensive meningitis as well as thrombosis. Lastly, there was the case of a man who suffered from epileptic seizures, which were at first confined to one leg. Prof. Annandale operated upon him, and found, in the position to be expected from the symptoms, a cyst, which he removed, with the result that the patient had experienced considerable benefit. Nevertheless, he was still unable to follow his occupation, and Prof. Annandale was inclined to try a second operation in order to endeavour to get away more cystic material. In the meantime, however, under potassium bromide the man was keeping free of fits, but if this should fail, he thought that it would be wise to return to surgical treatment. He would sum up by saying that according to his own experience they might conclude—(1), That, with proper antiseptic precautions, the operation of trephining was a safe one; (2), that operations at the seat of injury to the skull were very often followed by a most advantageous result, and often by a cure; (3), that in cases where there was evidence of a localized lesion, and where the symptoms were such as to entitle them positively to localize it, they were warranted in having recourse to surgical interference for its relief, whether the disease was abscess or tumour; (4), that in cases where there was undue intra-cranial pressure and suffering in consequence, they were fully warranted in trephining, even though merely as a palliative measure.

Dr M'Bride then read the following paper on the DIAGNOSIS AND PROPHYLAXIS OF INTRA-CRANIAL COMPLICATIONS FROM EAR DISEASE:—[1]

It is no part of my purpose to go over *in extenso* the well-worn theme of the connexion between ear disease and intra-cranial mischief. I shall content myself by assuming a knowledge of the facts and theories as they appear and have appeared in current literature.

In such a discussion as we are now engaged upon, nothing can

[1] I should like it to be understood that this paper is in no sense intended to be exhaustive. It was read as a contribution, from the aural point of view, to the discussion on Intra-cranial Surgery.

be gained by varying the verbiage of text-book utterances. I shall therefore, so far as possible, confine myself to criticism and novelty, and my vanity is not sufficient to encourage me in the hope that I shall be able to supply much of the latter.

As we are all aware, the intra-cranial dangers from ear disease which are most to be dreaded resolve themselves into—(1), Meningitis; (2), phlebitis of the cerebral sinuses, especially the sigmoid; (3), abscess. We may, I think, put aside the risks of hæmorrhage resulting from arrosion of the lateral sinus, while bleeding from the carotid does not fall within the scope of our subject.

Let us now turn for a moment to the symptoms manifested by the victims of intra-cranial inflammation following ear disease.

As a rule, the patients have suffered for a period of varying length from a chronic discharge from the ear. Among the poorer classes, however, this may have passed unnoticed, and the history may point merely to recurrent discharges, or sometimes the sufferer or his relatives may deny, in perfect good faith, all knowledge of a "running ear." As a matter of fact, even in chronic suppuration of the tympanum the pus may be secreted in such quantity that it does not run out of the meatus. Sometimes even when no history of discharge exists, the question, "Does any ill-smelling wax come from the ear?" will elicit an affirmative answer. Now, cerumen is practically odourless, and certainly not fœtid, so that we must look elsewhere for the fœtor, which may be due to eczema or some other condition of the meatus, but more probably is caused by chronic suppuration of the middle ear. It must also be borne in mind that while chronic disease of the tympanum is the common cause of cerebral mischief, the latter may owe its origin to acute otitis media.

When a patient with head symptoms, which may be due to ear disease, comes under observation, the first necessity is, in my opinion, a careful objective examination of the ear. A good deal of information may thus be gained. The question, "Did your ear ever run?" may be answered in a way calculated to mislead, as I have already shown; and, besides, there may be no one to answer it, for the patient is not always able to do so. Even if there be a history pointing to past or even present ear disease, it by no means follows that this affection and the head symptoms are related to one another as cause and effect.

This brings us to the question, "In what form of middle-ear inflammation would the probabilities point to such a connexion?"

In a case of acute otitis media with a bulged membrane, were head symptoms to occur I should expect them to be due to the ear condition, unless some manifest second cause could be suggested. This statement applies with even greater force to an acute case in which perforation (either artificial or natural) has already taken place, and where symptoms pointing to cerebral complications exist. From this last statement, however, I desire to except,

to a great extent, acute middle-ear inflammation following influenza. It is true that after this disease a form of the affection may occur which tends rapidly to be followed by implication of the temporal bone with all its attendant risks. It is, however, equally true that a considerable number of cases are characterized by a continuance of pain after perforation of the membrane, and yet no harm ensues. Not only may pain continue, but the temperature may remain high, and sometimes the whole case presents all the characteristics of threatened intra-cranial mischief, and yet all the symptoms may disappear without any operative interference.

If a patient suffers from chronic suppuration of the middle ear, and at the same time shows evidence of intra-cranial inflammation, probability certainly points to the former as the cause of the latter. To say, however, because a patient has or has had a running ear and has now head symptoms, that therefore the ear must be the cause of the intra-cranial mischief, is most illogical. Very strong presumptive evidence of the connexion of the two as cause and effect is afforded if the history points to pain localized in the ear as having preceded more diffused headache. I need hardly touch upon the fact that the occurrence of tenderness or swelling in the neighbourhood of the ear points in the same direction.

Coming now to actual examination with the speculum, we trench upon more difficult ground. It is commonly believed that perforations of Shrapnell's membrane, indicating, as they do, attic suppurations, are more often causes of intra-complications than other forms. Of this I have never been able to convince myself. Of course, however, a small perforation, wherever situated, is more dangerous than a large one. A large clean cut orifice in the lower part of the membrane, associated with a pink healthy-looking tympanic mucosa, is, so far as my experience goes, least likely to be found in a case in which intra-cranial suppuration depends upon ear disease. Complete destruction of the membrana tympani, however, does not always come under this category. In these cases we often find that the malleus is left with two shreds of membrane alone supporting it in its upper part. On observing closely, pus may be seen to be oozing from the roof of the tympanic cavity, and in almost all these cases the secretion is intensely fœtid. Where this picture is found in a head case, the symptoms of which are consistent with an aural origin, the last named is probable.

The presence of granulations in a diseased ear is strongly suggestive of defective drainage, and must therefore be looked upon with suspicion. Sometimes a polypoid mass may be seen to grow from the posterior wall of the meatus, and to be exuding pus from its centre. A bent probe introduced into this will often come upon carious bone. It is almost unnecessary to add, that whenever the probe detects dead bone objective evidence of the presence of a dangerous ear lesion is furnished. The same may be said of

cases where we have, either from ocular evidence or from the history, reason to suspect the presence of cholesteatomatous masses within the recesses of the middle ear.

In estimating the probability or the reverse of the extension of inflammation from the ear to the endo-cranium, I attach much importance to the presence or absence of fœtor. I have said that a large healthy-looking perforation in the lower part of the membrane usually makes me doubtful of the ear as the cause of the head trouble. My next step, after finding this condition, is to pass a little cotton wool twisted round a probe down to the perforation and rub its edges. If after this no trace of odour be perceptible on the wool, I am strongly inclined to think that the ear should only be looked upon as the "fons et origo" if no other possible cause can be discovered. It is well known that when danger threatens from an otorrhœa the discharge often gets scanty or appears to cease altogether. In such a case, however, a little dried-up *débris* at least will be detected in the meatus, and this will be found, if tested by the method indicated, to be most intensely offensive.

Let us now turn to the consideration of the course of events when intra-cranial inflammation results from ear disease.

I believe that the first manifestation of danger will invariably, or almost invariably, be pain in the ear, or perhaps over the mastoid. Sometimes the latter is distinctly tender, or it may show evidence of inflammation either in the form of external swelling or projection of the auricle, resulting from exudation between the bone and the cartilaginous meatus. I cannot help thinking that a good deal of misconception exists with regard to so-called mastoid periostitis. For my own part, I am always inclined to think that, given deep-seated pain in the ear with some pyrexia and a tendency to rigors, the appearance of distinct external evidence of inflammation over the mastoid is a favourable rather than an unfavourable symptom, for it indicates that the spread of inflammation is outward rather than inwards. Tenderness without any external evidence of inflammation is of much graver import, indicating, as it does, deep ostitis.

Pain in the ear is soon followed by diffuse headache, and vomiting may or may not occur. Whenever this state of matters has been reached, or, indeed, whenever in a case of middle-ear suppuration danger seems to threaten the patient from this cause, drainage is urgently indicated, and one of the operations to be referred to later should be performed.

We must now turn very briefly to the diagnosis of intra-cranial mischief as it results from ear disease. I shall presently touch upon the differential diagnosis of the different forms of inflammation which may attack the brain and its membranes. First, however, we must ask ourselves whether it is possible to distinguish commencing intra-cranial mischief from the symptoms liable to be

caused by retention of pus in the middle ear. I venture to think not, for both conditions give rise to pain, both may be associated with rigors and vomiting, in both we may have giddiness, and sometimes optic neuritis has been found absent in the graver lesion and present in cases which have recovered without operative interference. These facts being as they are, we are often left in doubt at the very threshold of our subject. It is therefore all the more important to establish free drainage from the middle ear early in the case. Manifestly, if serious symptoms continue after this has been done, we may suspect that the intra-cranial structures have become implicated, or it may be that in removing diseased portions of the temporal bone we have to do so to such an extent that an extra-dural abscess is opened and drained, as occurred in one of my own cases, where the patient made an excellent recovery.

As before said, the extension of pyogenic organism to the brain and its membranes may give rise to—(1) abscess; (2), meningitis; (3), phlebitis of the sigmoid and other sinuses. Can we differentiate these conditions? We have seen how difficult it often is to decide when inflammation has already attacked the intra-cranial structures. We have now to point out how hard it is, given the existence of suppuration within the skull, to determine its exact nature.

It is no uncommon thing to meet with septic thrombus of the sigmoid (or other) sinus, purulent meningitis, and abscess in the same case, while two of these conditions, of course, still more frequently co-exist. It is a regrettable fact that, brought face to face with the intra-cranial complications of ear disease, the dicta of the text-books are of little use. In such a case it is probably best to begin by having an hourly, or at least a two-hourly temperature chart prepared. If we find very marked fluctuations within short periods, and if rigors be severe and frequent, associated with perspirations, we may suspect septic thrombosis, which in most cases has involved the sigmoid sinus.

Time does not permit me to enter upon the signs and symptoms which differentiate a thrombus in this vein from a similar condition of other sinuses. Suffice it to say that not uncommonly the jugular can be felt to be corded, and that more or less œdema of the mastoid and adjacent region may be found, while there is marked stiffness in the neck. Both conditions, however, may be readily similated by inflammatory swelling of the glands under the sterno-mastoid, and by inflammation of the mastoid bone.

Again, it has been said that in thrombosis of the sigmoid sinus there is defective filling of the jugular on inspiration, but I have not been able to verify this symptom. In not a few cases evidences of septic changes in the lungs, and even in other parts, are met with. The presence of a patchy pneumonia, if it exist, will therefore form corroborative evidence of the existence of septic thrombosis.

Let us now ask ourselves by what signs and symptoms we are to differentiate the condition just described from diffuse suppurative meningitis. In both cases there is headache, in both there may be optic neuritis, and in both there is pyrexia. The latter is, however, more continuous in meningitis, there is an absence of the marked remission and rigors, there is perhaps more intolerance of light in the early stages, and, finally, a greater degree of tenderness. The diagnosis of suppurative meningitis is, moreover, often complicated by the possibility of its being of tubercular origin, and then another difficulty is added to the already difficult task.

Intra-cranial abscess is the next complication the diagnosis of which we must consider, and the chief question is whether in this condition there are found any symptoms which definitely distinguish it from meningitis. In spite of the elaborate semeiology which has been described in connexion with cerebral abscess, I have very grave doubts whether for purposes of differentiation any points other than the following are of importance in the majority of cases, viz.,—(1), Pulse; (2), temperature; (3), percussion tenderness. Undoubtedly pulse and temperature are the most important. If either or both be persistently subnormal, strong probability points to a localized collection of pus. This may also be suspected if at some period of the case either have been noted to be considerably below the normal. Sometimes localized percussion tenderness is of value, but it is at best of secondary importance. Sometimes a chronic abscess may be diagnosed by the following combination of symptoms,—(1), Pain in one ear, which is the seat of suppuration; (2), optic neuritis; (3), subnormal pulse and temperature; (4), continuous headache. Alike in meningitis and abscess, so-called focal symptoms are usually absent. When they do occur in a comparatively early stage, their existence is presumptive evidence in favour of abscess. In the later stages of meningitis it is, of course, possible that various nerves may become involved, while paresis in the regions supplied by the pneumogastric, glosso-pharyngeal, and spinal accessory nerves has been observed in thrombus of the sigmoid sinus and jugular. In a suspected case, then, if we have evidence of hemiplegia, paresis of the third nerve, rapidly increasing deafness on the opposite ear, without apparent cause or other localizing symptoms, we may from these draw conclusions in favour of abscess. It has been suggested that estimation of the quantity of pus issuing from the affected ear may be utilized in certain instances, and Macewen records a case in which examination of the ear revealed erosions in the tegmen tympani from which pus issued. Probably the upper part of the tympanic cavity is here intended, for the tegmen tympani cannot be seen through the speculum.

These methods of examination seem to be of value in the few cases where positive results can be obtained, and the same statement applies with even greater force to cases in which a

fistulous communication can be discovered. When all is said, however, the diagnosis of intra-cranial abscess can rarely be arrived at with any degree of certainty. It may be noticed that I have not referred to the state of the pupils, as I doubt whether their condition alone has much differential value, and I have endeavoured to touch only upon points which appear to be of special importance.

Even assuming, however, that we have been able to diagnose the existence of an abscess, another grave difficulty confronts us. Is the pus in the cerebrum or cerebellum? There are certain points which may in some cases be of use as guides on this point. Thus if there be marked involvement of the mastoid region, the probability of cerebellar abscess is greater than where the symptoms are confined to the tympanum. Again, if the tuning-fork test points to nerve deafness we may, if other symptoms lead to the suspicion of cerebellar mischief, be thus strengthened in our surmise. It is said that very marked sickness, great pain, especially in the occipital region, and giddiness, are more or less characteristic of cerebellar mischief. Macewen seems to attribute importance to slowing of the respiration, yawning, clenching of the teeth, and retraction of the head as evidences of cerebellar abscess. Perhaps, however, our working hypothesis ought at present to be the greater probability of abscess in the temporo-sphenoidal lobe; for no statistics adverse to this statement have yet been adduced. Unless, therefore, the symptoms point very conclusively to the cerebellum, the cerebrum ought first to be explored; and in weighing these symptoms we must not forget that both giddiness and vomiting may be due to ear disease alone.

Let us now turn to the question of prophylaxis of intra-cranial complications due to suppurative middle-ear disease. I shall not waste time by reference to the indications for such simple interference as puncture of the tympanic membrane in acute cases, enlarging small perforation, or removing granulations and polypi in chronic diseases. The operations which may in a larger sense be considered prophylactic are somewhat more grave than those, viz.—(1), Excision of the tympanic membrane and malleus, with or without removal of the incus; (2), opening the mastoid antrum; (3), Stacke's operation and its modifications.

There can be no doubt that the first of these operations is of very great value in draining the attic of the tympanum. It is further satisfactory, in so far that the hearing is by no means necessarily harmed, and often improved. I do not think time will permit me to enter into details as to the method, which can, moreover, be found described in recent text-books. I hope at our next meeting to show a patient in whom this operation has been successful both in relieving pain and improving hearing.

Opening the mastoid antrum according to the classical method advocated by Schwartze is now an operation known to all

surgeons. It yields the most excellent results in acute and sub-acute cases, but in chronic ear disease it only sometimes leads to an absolute cure, and this only if the communication with the antrum be kept up for a long time.

Bergmann and Küster both recognised this, and proposed the removal of the upper and posterior walls of the meatus. It was reserved, however, for Stacke to introduce an operation which, I think, fulfils surgical principles to an extent not previously attained. Briefly, his *modus operandi* is as follows:—An elliptical incision is made a little behind the posterior and upper attachment of the auricle. The soft parts, including the periosteum, are detached forwards, and this process of detachment is carried into and round the meatus. The soft parts of the auditory canal are cut through as deep as possible, and the flap—including auricle, cartilaginous meatus, and skin and periosteum of the osseous canal—is drawn forwards. Either by direct or reflected light the remains of the membrane and its surroundings can be seen. The upper part of the tympanic ring is then chiselled away, and access is thus gained to the attic of the tympanum. After this the remains of the membrane, together with the malleus and incus, are removed. If the tympanic cavity alone is affected, this terminates the operation. If the mastoid also is involved, Stacke seems to open the antrum in the ordinary way, and afterwards take away also the posterior wall of the meatus. He then forms a flap from the soft parts which have been loosened from the meatus, with which he covers the bone.

In a case which I recently operated on by this method, I reached the antrum by removing the posterior and upper wall of the meatus. This did not necessitate any further incision, and the wound behind the ear was closed by sutures after the soft parts of the meatus had been slit longitudinally, as recommended by Stacke. After this the external auditory canal was dusted with a mixture of boracic acid and iodoform, and plugged with iodoform gauze. I hope to show this patient at our next meeting.

I feel that I have already wandered beyond my province, and do not desire to trespass upon the question of treating intra-cranial abscesses. The success which has attended the method of operating just described, however, has led me to reflect whether in most cases of intra-cranial mischief due to ear disease it would not be well to carry out Stacke's operation or some modification of it. In this way the hidden recesses of the middle ear can be explored, all dead bone can be removed, and in removing it we may hit upon an extra abscess, or upon a fistula indicating the existence of a hidden lesion, as recorded by Jansen, who, by enlarging an orifice in the region of the horizontal semi-circular canal, was able to drain a deep extra-dural abscess.

Further, by removing the upper wall of the meatus, we may, if we so desire, explore the dura, and, if necessary, the tegmen

tympani may also be taken away. Again, in operating on the mastoid, we should, I think, remove all diseased bone, regardless of the question of exposure or non-exposure of the dura and sigmoid sinus. The evils of doing so are certainly less than the dangers incurred by leaving the infected osseous tissue *in situ*.

I hope to show at our next meeting a patient in whom I removed in this way most of the mastoid and portions of both the parietal and occipital bones, evacuating at the same time an extra-dural abscess, which was evidently in intimate relation with the lateral sinus. One of the difficulties which at present beset aurists is the question when to recommend an operation. Removal of the membrane and ossicles may injure the hearing, although it does not usually do so, and in some of the cases where this operation seems to be most indicated—*e.g.*, perforations of Shrapnell's membrane—the auditory function is frequently very well preserved. It therefore becomes a serious question whether we are entitled to advise so important an operation before evidence of danger, in the shape of pain, has shown itself. Of course if the patient resides out of reach of skilled assistance, this should weigh with us in recommending the operation. Again, with regard to opening the mastoid, Stacke's operation and its modifications, the same dangers to hearing exist, and from the very nature of these methods there must be some risk to life from their performance.

Here, too, I have been accustomed to wait for the evidence afforded by pain, excepting in cases where the patients were to be out of reach of skilled aid.

Whether one is justified in thus delaying is of course a doubtful point. A large number of people have more or less discharge from the middle ear all their lives; others have frequently recurrent discharges, and are yet none the worse to all appearance. If one can have such persons within reach, I believe that a fairly safe rule is to operate soon after the occurrence of persistent pain. Of course I do not refer to cases where manifestations of dead bone are present, which, in themselves, are usually enough not only to warrant but to indicate interference.

Dr George Berry said that as far as the eye was concerned there was little one could say about actual brain surgery. In the first place, as regarded inflammation, he had seen cases in which septic inflammations about the eye had been followed by meningitis. In these very little could be done, as the meningitis soon became general. In one such case he had trephined, with Prof. Chiene's assistance, after the patient had become comatose, and succeeded in relieving the condition so far that he recovered consciousness, and lived for some days. Another way in which inflammation of the brain occurred from the eye was after enucleation, and that, no doubt, also from septic causes. He had had a result of this kind in a case in which not the eye alone but the whole contents

of the orbit were removed. In all the reported cases the symptoms developed within forty-eight hours of the operation. A short time ago he had had a case in which he had to remove the eye for injury, with septic inflammation, and within twenty hours afterwards meningitis came on. Although there were no local symptoms he turned out the clot in the orbit and washed the wound with corrosive sublimate. Though everything was sweet it seemed that the mischief must have passed from the orbit to the brain. The case ended fatally, and on post-mortem examination it was found that there had been no extension from the orbit, but that there had been old disease of the ear, and that there was an abscess of the cerebellum. The wonder was what could have set up this condition all at once. The only thing that he could suggest was that the chloroform might have rendered active an old abscess. Regarding Prof. Grainger Stewart's case—in which, following injury to the head, there was optic neuritis—though he did not want to question the diagnosis, he had never seen this condition except where there was cerebral tumour or abscess. He had, however, seen permanent paralysis of accommodation following injury to the head, and since in this case the difficulty was especially in reading, it was probable that the condition might have been of this kind, and not optic neuritis.

Prof. Grainger Stewart explained that the account of the ophthalmoscopic observations had been obtained from Dr Argyll Robertson.

Dr Berry, continuing, said it was the experience of every one that optic neuritis was one of the most prominent symptoms of cerebral tumour. With abscess, on the other hand, he had been astonished to find that optic neuritis was extremely rare. With regard to the important localizing symptom of hemianopsia, he had seen a good number of cases in which injury to the back of the head had produced epilepsy and hemianopsia. He had also seen some cases in which, without injury, these two symptoms were present.

Dr Joseph Bell said he would like to say one or two words bearing upon individual experience of a considerable length of time. In the first place, he would be inclined to emphasize that they must now regard the operation of opening the cranium as not a thing in itself of any remarkable or great danger. He believed, and had always taught, that they trephined far too seldom. His own experience was that in cases of intra-cranial traumatism the results were, as a rule, exceedingly good if they succeeded in getting away pieces of bone that had been driven in, or if they opened any abscess and got free relief to pressure. He would put it in this way. They ought not to be afraid of the operation of trephining, and since the days of antiseptic surgery they should be still less afraid. Regarding middle-ear disease, he had seen a great deal of

it lately in the small children brought to the Sick Children's Hospital. These patients were not able to tell them about tuning forks, and often not even about pain. He was not inclined to attack these cases from the aurist's side, but rather from the surgical point of view, and to cut down upon the mastoid antrum. His experience as to cerebral abscess in these cases was a very disappointing one. In the diagnosis of its existence they had most to be guided by the subnormal pulse and temperature. He did not lay much stress upon optic neuritis, except as a sign of cerebral tumour. Temporo-sphenoidal lesions were, he thought, much more frequent than cerebellar. If, however, a temporo-sphenoidal abscess was not found they should try for a cerebellar one. Most of the results were bad. There was relief only for a day or two. The pathologist usually found a great deal more in the cranium than had been expected,—complications of all sorts. The more he saw of such cases the earlier was he inclined to tackle them. Regarding microcephalus, after reading about Lannelongue's operation he had been anxious to try it. Two years ago he happened to have a case of the kind. It was a very small child with a small thick skull, and it was blind and deaf. It spent its time in having fits and crying. On this patient he performed Lannelongue's operation for the first time, he believed, in Scotland. He removed a large elliptical portion of the skull extending from the front to the back. The wound healed by first intention. The operation was followed by a fairly good result. The fits stopped and the crying diminished. The child lived about a year, and then died of something else. A post-mortem was not obtained.

Dr James Carmichael said that he agreed with Dr M'Bride as to the extreme difficulty of localizing cerebral inflammation arising in connexion with ear disease, especially in children. He had always been strongly impressed with the fact that when there was abscess formation the temperature was usually subnormal. Indeed, he believed there was seldom a pyrexial temperature in children in cases of brain abscess. This also obtained with regard to collections of pus in other cavities in children, notably the pleura. As to the exact site of cerebral abscess there was little to guide us. In a case which he had had recently arising from ear disease, the temporo-sphenoidal region was cut down upon, but nothing was found. At the post-mortem an abscess was discovered in the cerebellum. In numerous cases of chronic hydrocephalus he had tried draining. The results, as regarded ultimate cure, were very bad, but in many cases there had been great relief to symptoms, and prolongation of life. The patients unfortunately were not usually brought to the hospital until the condition was far advanced, when the effusion had become so great as to cause atrophy of brain tissue, so that really recovery was practically precluded. He believed that if they could continuously

drain these cases in the early stage, good results would be got. Regarding tubercular meningitis, from the physician's point of view they were in a perfectly hopeless condition. He believed, however, that the day would come when in certain of these cases surgical interference might be resorted to with benefit. A great many of them died rapidly from pressure due to intra-cranial effusion. When the brain was examined after death, frequently very little was found but effusion and extreme congestion, and often very little disease in other parts of the body. He therefore did not see why in certain very rapid cases, where the patient was believed to be otherwise healthy, they should not endeavour to relieve the pressure by surgical means. We knew that drainage of the peritoneum in tubercular peritonitis was not only a justifiable, but frequently successful operation, and if any perfect method of continuous drainage in brain cases could be found, good results might be expected.

Dr Dow said that he might give his first experience of cranial surgery. A man had a fracture over the temporal bone, and symptoms of compression of the brain followed. He cut down in order to remove the depressed bone. The man did well, except that a large piece of brain protruded from the opening. He did not know very well what to do with it, and after waiting a long time he thought that the best thing was to take it away, which he did. The wound healed up, and the man recovered quite well. He was very much interested to know if he had done his mind any harm, so he asked him if his memory was quite good? "Yes, it is as good as ever," replied the patient. "Is your mind as good as it was before, do you think?" "Yes, yes,—but I'm no jist sae fond o' the lassies as I was."

Dr Andrew Smart, continuing the discussion, remarked that as he was restricted to the subject of cerebral hæmorrhages of traumatic and non-traumatic origin, he would not refer to cases of trephining for epilepsy and alcoholic convulsions occurring in patients who had been under his care. To illustrate both types of hæmorrhage he would select a patient in whose individual case both conditions were probably represented, *i.e.*, an induced predisposition to hæmorrhage from chronic alcoholism, in which a comparatively slight blow on the head was followed by hæmorrhage at the base of the brain. The patient was a woman about 45, who was brought by the police to the Royal Infirmary in June 1890. She was then conscious, and answered questions intelligently. There was a contused wound on the right side of the head near the parietal eminence, where she had received a blow in falling. The face was drawn to the right, but without ptosis or ocular deviation. The pupils were medium-sized, and reacted fairly to light, but a careful examination of the eyes showed the existence of left lateral homonymous hemianopsia. She could not raise the left

arm nor grasp with the left hand, the left forearm remaining flexed, and the fingers curving upon the palm. The thigh and leg movements were defective in a less degree; and the sensibility of both arm and leg, as also of the whole of the left side, was irregular and deficient. Speech was somewhat slurring, but not aphasic. Some hours after admission coma set in, and some hours later Cheyne-Stokes breathing supervened, and soon became so grave as to threaten life. Prof. Chiene, at his request, operated, first at the place where the blow had been received, and a second time further forward and a little lower. There was free hæmorrhage from the membranes, but no discoverable cause was found within reach of the director or finger to account for the symptoms. This confirmed the diagnosis that the hæmorrhage was at the base. The breathing, which before the operation was characterized by long pauses and almost suspended, had by the time the operation was completed become almost normal, and the patient began to regain consciousness. These results were especially noticeable after incising the dura, which was immediately followed by cerebral hernia, thereby affording more effectual relief to the cerebral pressure. The patient thereafter, as regards her intelligence and otherwise, continued to improve until the month of August of the same year, when she was discharged in full possession of her faculties; the hemiplegia above referred to continuing, with the addition that the left intercostal muscles and, apparently, the left half of the diaphragm were observed to be involved in the motor paralysis affecting the left side. In May 1891, eleven months after the operation, she was re-admitted for electro-massage treatment on account of the hemiplegia. In all other respects she was in excellent health, and in full possession of her mental faculties. At this time Dr George Mackay, at his request, examined the eyes by the perimeter, the result showing the continuance of the hemianopsia. This was the first case on record of trephining for apoplexy at the base of the brain. [Dr Smart exhibited this woman (E. H.) at the adjourned meeting of the Medico-Chirurgical Society held in the hall of the Royal College of Physicians on Friday, 23rd February 1894, at eight o'clock P.M. She had travelled a considerable distance to be present. She appeared in excellent health, and in full possession of her mental faculties, four years, nearly, after the operation.] Dr Smart, referring to the general indications which he thought useful as a guide in trephining in traumatic and non-traumatic cerebral hæmorrhages, expressed his views in the following summary:—1. To operate at seat of hæmorrhage if localizing symptoms, and if nothing found, operate a second time on opposite side over area of counter stroke. 2. In cases of general hæmorrhage without localizing symptoms trephining would relieve pressure, and might, as in the case of H., save life. In such cases the more freely the dura was exposed and incised the more certainly would relief to pressure be given. 3. In cases in which

there are symptoms of basal hæmorrhage, as in H.'s case, the nearer the operation was to the seat of lesion, and the greater the extent of the dura which it was safe and practicable to expose and incise, the greater would be the likelihood of affording effectual relief. 4. Those hæmorrhages arising within the substance of the brain or in its membranes, if extensive, were not usually accompanied by localizing symptoms, except in their earlier stage. 5. The rule for operating in traumatic lesions, with or without localizing symptoms, would equally apply to those lesions which belong to the non-traumatic class. 6. The primary object in operating being, by general consent, to relieve cranial pressure, why should we not operate in every case in which pressure symptoms were present, and more especially when they endanger life? Do the risks in such cases outweigh the possible benefits to be obtained by operating? 7. What we seemed to want at the present stage of cranial surgery were instruments more in keeping with our advancing knowledge in this department, by means of which we could more expeditiously expose a larger extent of dural membrane for rapid inspection and operation. In other words, the more completely we put the brain with its limiting sac, the dura, in the position of an external organ the more would we be able to accomplish results which we were at present scarcely in a position to realize. Supposing, for example, we could, say with the aid of an electro-rotatory saw or some such instrument, quickly remove the skull cap, leaving the dural membrane intact, the immediate effects of such procedure as assisting diagnosis and operative interference would be incalculable.

Dr Byrom Bramwell moved the adjournment of the discussion, which was agreed to.

Meeting VI.—February 21, 1894.

Dr Clouston, *President, in the Chair.*

Discussion on Intra-Cranial Surgery—*Continued.*

I. Exhibition of Patients.

1. *Prof. Annandale* showed a patient from whom a TUMOUR OF THE BRAIN had been removed three years before.

2. *Mr Cathcart* showed—(*a.*) A patient who had been operated on for BRAIN ABSCESS after having been trephined for mastoid disease. (*b.*) A patient in whom the MASTOID had been TREPHINED without benefit; trephining was subsequently performed over the temporo-sphenoidal lobe, and pus evacuated.

3. *Dr M'Bride* showed a patient in whom STAPHI'S OPERATION had been performed.

4. *Dr M'Kenzie Johnston* showed a patient in whom DRAINAGE OF THE MASTOID ANTRUM was kept up by means of a lead canula.

5. *Dr MacGillivray* showed a girl who had been TREPHINED and the LATERAL VENTRICLES ASPIRATED with beneficial results.

6. *Mr Alex. Miles* showed for *Mr A. G. Miller* a patient who had been operated on for JACKSONIAN EPILEPSY, a cure resulting (published *Lancet*, 21st November 1891). A. S., æt. 42, wiremaker, received injury to head November 1884. The scalp wound healed, the cicatrix remaining tender. He had had his first fit 26th June 1888, while in bed, three and a half years after injury. A second fit next day,—partial aphasia, convulsions affecting right side of face, right arm and leg, and then whole body. He was admitted to the Royal Infirmary, under Dr Wyllie's care, in July 1888, and transferred to Mr Miller's ward 10th July 1888, having had 27 fits in the previous twenty-four hours. He was operated on 4.30 the same day. Three circles of bone were removed over Ferrier's areas 12 and 6, and the dura opened, but nothing abnormal found. After the operation the fits increased. On 11th July he had 46 fits, and was completely aphasic, though conscious. After 21st, fits were less severe, affecting face only. On 23rd July he had as many as 219 fits in twenty-four hours. On 4th August fits began to diminish in frequency. Last fit occurred on 14th August. While in hospital he took bromide of potash without any appreciable effect on fits. Discharged well 22nd October 1888. Since then he had had only one fit, on hearing of the sudden death of a child. The fit was slight, and he recovered in a few minutes. Since leaving hospital six years ago he had only this one fit, and could do a full day's work. A marked depression was perceptible where the circles of bone had been removed. The depressed area was quite firm, and not tender to the touch.

7. *Dr Stewart*, Leith, showed—(*a*), A patient TREPHINED FOR MIDDLE MENINGEAL HÆMORRHAGE; (*b*), a patient TREPHINED FOR INJURY,—a cure resulting in both cases.

8. *Dr MacPherson*, Larbert, showed a GENERAL PARALYTIC who had been TREPHINED, and the disease arrested.

9. *Dr George A. Gibson* showed, for *Dr Felkin*, a patient who had been TREPHINED FOR SUBDURAL CYST. J. I., residing in Edinburgh, aged 23, came under observation in January 1888. The patient's right arm and leg were badly developed, and to a large extent paralyzed. She had a lateral curvature of the spine, diverging to the left in the lumbar region, and to the right in the dorsal region. With the right hand she could just pick up a pencil with her fingers; she had hardly any power of grasp; she could only bring her hand with difficulty to within two inches of her mouth; she could not move her hand at the wrist joint, nor could she support her forearm. She had no sensation in the right arm; the radial pulse was smaller than, though synchronous with, the left, and the right arm was three inches shorter than the left. The

right leg was an inch and a quarter shorter than the left. She could not walk a mile, and had great difficulty in hobbling about. The right extremities were both cold and clammy to the touch, and uniformly one and a half to two and a half degrees lower in temperature than those on the opposite side. When ten months old the patient received a blow on the head from a brick falling from the roof of one of the houses in the High Street, and on examination in 1888 a trench-like depression in the bone of the skull could be felt on the left side crossing the fissure of Rolando one inch above its external extremity. Full details of the case were published in the *Medical Chronicle*, October 1889. Mr Hare operated on the 18th of January 1888, and found a large extra-dural cyst extending to a depth of two inches from the surface of the skull, and an osteophytic growth was felt growing inwards from the inner table of the skull, extending inwards half an inch towards the surface of the brain. This was removed, and also as much as possible of the outer wall of the cystic cavity. Nine portions of bone were planted on the outer surface of the dura, and the wound closed, a catgut drain being introduced at the posterior end of the wound. Healing was complete on the twelfth day. The patient was shown at a meeting of this Society on the 15th of February 1888. The progress of the case has been good. The patient can now walk easily six or eight miles without discomfort. She is a member of a church choir, she is bright and cheerful, works a sewing machine, and is fit for hard household employment. The leg has grown an inch and a quarter since the operation; the arm two and three-quarter inches. The spinal curvature is less, the temperature on both sides of the body normal, and sensation has returned to both arm and leg. The patient can grasp 25½ degrees of the dynamometer scale, and she can write with her right hand, although not very well. The movements of the right hand are still limited, but she has considerably more power in it when unnoticed that when she is conscious of observation.

10. *Mr Caird* showed two cases TREPHINED FOR INJURY.

11. *Dr James* showed a patient operated on for EPILEPSY.

II. Discussion—*Continued.*

Mr John Duncan said that operations in intra-cranial surgery might be practically divided into the aseptic and the septic. Taking the aseptic cases, there was an immense number of subjects on which they still desired knowledge. One of these was the localization of function in the brain. On this point he could confirm the observations already made in the course of the discussion as to the apparent uselessness of the frontal lobes. A boy was kicked on the forehead by a horse, and about a dessertspoonful of brain tissue came through the wound and lodged on his cheek.

There was a hernia cerebri for six months, but it ultimately closed. The boy died of phthisis three years later. During all that time, as far as his mental condition was concerned, he was, according to his friends, absolutely well. Another point upon which they wanted information was the nature of nerve action, and of its excitants and depressants. Experiments had to a certain extent shown the relationship of various electrical currents to nerve action, but their pathological knowledge was still exceedingly imperfect. Speaking generally, one might put it that an excess of pressure diminished nerve action, and that hyperæmic and irritative conditions increased it. In this relation he would like to draw the attention of some of those who had already spoken to the fact that epilepsy was by no means to be looked upon as a pressure disease. It was a disease of irritation. It might be connected with surgical injuries, but not in the way of pressure directly. The pressure merely set up a hyperæmic and diseased condition of the brain tissue, which was likely to produce epilepsy. In this connexion he might refer to the case of a little child who was brought into his ward suffering to an extreme degree from epileptic fits due to compound fracture three years before. He trephined, and found that there was a big hole very nearly in the centre of the forehead, through which the dura mater was tightly adherent to the pericranium. Absolutely nothing else was found. The dura was opened, and the arachnoid was seen. There was nothing wrong with it. As a result of the operation there was a very great diminution of the fits, and for many months an entire abolition of them. After the child went home, however, they returned, but again diminished on the patient's re-admission to hospital. There were so many factors bearing upon these epileptic cases that the investigation of the subject was attended with great difficulty. The centre of irritation was often not in the brain at all. He had operated in a case of epilepsy in which the removal of a stone from the bladder was followed by an extraordinary diminution in the number of fits; and they probably all knew of cases in which the removal of a long prepuce had cured convulsions. Great benefit was no doubt to be derived from the removal of any well-defined source of irritation in epilepsy, but he did not regard the mere trephining of the skull with a vague idea of relieving pressure as an operation likely to be followed by success. Another point upon which he would like to have further information was the physics of the brain. They knew very little of the conditions under which the normal tension of the cerebro-spinal fluid was produced and maintained. They might now, he supposed, hold it an exploded theory that the encephalic contents were to be looked upon in the light of an incompressible fluid in a rigid case. The conditions were rather to be looked upon as analogous to those of the testicle within its tunic, or the contents of the thorax and abdomen in their walls, the difference being rather in the delicacy of the structure and mechanism than anything else. Possibly they

might regard the nervous tissue of the brain in the light of an incompressible fluid—a sort of œdematous jelly; but it was to be remembered that it was permeated very thickly with other structure, such as bloodvessels, which must alter very remarkably the effects of pressure. It was important to understand that they might have in the brain two kinds of compression, a general and a local. In illustration of this point he mentioned two cases. A woman was brought to the Infirmary in a state of coma following an injury to the head. There was a small cut in the temporal region. Thinking that this would be the seat of pressure, he trephined over it. Nothing was found except a little contusion of the membranes. The patient died, and an extensive extravasation of blood was found on the other side, covering the whole of the motor area and much more besides. It had produced no localizing symptoms, only coma. The other case was that of a man who had hemiplegia following a depressed fracture. Removal of the depressed bone successfully relieved the paralytic condition. In the one case there was a general compression, in the other a local pressure without any general effect whatever. There were many extremely complex conditions to be taken into account in considering compression of the brain. There must be in the brain, as in all other organs, a certain power of adjustment to pressure in order to maintain that degree of tension most suitable for functioning. There must be a slow adjustment by atrophy or hypertrophy, and also a rapid adjustment; the latter took place through three channels,—the blood, the lymphatics, and the cerebro-spinal fluid. Undoubtedly the most important factor was the cerebro-spinal fluid. In connexion with its expression the relationship to the cord and the elasticity of its membranes was of extreme importance. There was seldom any effect upon the cord by increase of pressure in the brain. The effects of sudden loss of fluid they knew exceedingly well from the occasional accidental rupture of and surgical operations upon spina bifida. There was sometimes sudden death with convulsions if the fluid was drained right away. In such cases there could also be shown exceedingly well the adjustments to pressure that are possible, for the fluid in a spina bifida of considerable size could be squeezed into the general cavity often without producing the slightest effect. He had removed the whole of the fluid from a large spina bifida in the neck, without any bad result, before injecting iodine solution. These facts showed considerable power of adjustment. It was due to the immense power of secretion and absorption in the membrane. He had had a case of fracture of the spine in which for three weeks there was a continuous drain of 6 or 8 ounces of cerebro-spinal fluid per day. The tension was no doubt sufficiently kept up by the hindrance that was artificially maintained to the exit of the fluid. The effects of pathological increase of pressure were more difficult to understand; it was so constantly asso-

during life which enable a positive diagnosis to be arrived at. Cases of this kind are undoubtedly rare in ordinary physicians' practice. I do not, of course, refer to the cases which occur in asylums, where the headache and other symptoms are so often masked by those of mental derangement.

In the second place, in some of the cases of intra-cranial tumour in which the symptoms—such as headache, vomiting, giddiness, general epileptiform convulsions, and double optic neuritis—distinctly show (in the absence of meningitis, albuminuria, ear disease, lead poisoning) the presence of an intra-cranial tumour, there are no localizing symptoms which enable the physician to determine in what part of the cranial cavity the tumour is situated. These cases constitute a not inconsiderable proportion of the whole. Many cases of this kind have come under my notice.

The most remarkable, and in many respects it is one of the most valuable and instructive cases of intra-cranial tumour which has been published, is the following:—

A girl, aged 20, was admitted to the Newcastle Infirmary on 5th January 1877, complaining of headache, vomiting, and giddiness. Her present illness had commenced, three years previously, with headache. For eight months the headache had been severe, and she had occasionally vomited. She had never had a fit, but had once tumbled off her chair in consequence, she thought, of giddiness. There was no suspicion of syphilis. Sight was perfect, but the ophthalmoscope showed marked double optic neuritis. There was absolutely no trace of paralysis—in fact, no localizing symptoms of any kind whatever. An intra-cranial tumour was diagnosed, but its position was left entirely an open question. The patient improved for a time under full doses of iodide of potassium; but a month after her admission to the hospital she died in an epileptic fit.

On post-mortem examination an enormous tumour (a sarcoma) was found springing from the membranes on the right side of the brain. It measured from before backwards 3 inches; from above downwards 3 inches; and from without inwards 1½ inches. It had destroyed the whole posterior half of the inferior frontal convolution, the lower half of the ascending parietal convolution, the lower half of the ascending convolution, and the outer half of the island of Reil; and had invaded the superficial surface of the posterior half of the middle frontal convolution, the anterior half of the supra-marginal convolution, and the anterior half of the superior sphenoidal convolution. (See Figs. 1, 2, and 3).

This case is, so far as I know, unique; for no other case has been recorded in which there was such extensive destruction of the motor area of the cortex without paralysis; but it is by no means uncommon to meet with large tumours in the temporo-sphenoidal and frontal lobes—the "silent areas" of the brain, as they are sometimes termed—which are unattended with any very definite and characteristic localizing symptoms. In the frontal lobes the tumour is not always so "silent" as this term would lead one to expect. The occipital lobe was formerly also thought to be a silent area; but it is now known that lesions in this situation produce homonymous hemianopsia, a most important localizing symptom. The necessity of examining the fields of vision in all

cases of intra-cranial tumour in which the position of the tumour seems doubtful, cannot be too strongly insisted upon.

In the third place, in a few cases in which there are localizing symptoms, the symptoms give an erroneous impression as to the position of the tumour. These false or so-called pseudo-localizing symptoms are not, in my experience, common; they only occur, I think, in a comparatively small proportion of cases, but in the cases in which they do occur they lead to an entirely erroneous idea of the position of the tumour. In this connexion I may refer to a case which was mentioned by Prof. Grainger Stewart at the last meeting,—the case which was operated upon by Mr Alexis Thomson on Dr Gibson's suggestion. The details are as follows:—

An old soldier, aged 50, gate-keeper at Holyrood, was sent to me at the Infirmary by Dr W. J. White, complaining of pain in the head, numbness and stiffness in the left leg, and occasional spasmodic contractions beginning in the big toe of the left foot. He stated that the pain was worse at night, and that the spasms in the big toe occurred several times a day. He had had syphilis.

On examination, the skull was found to be markedly tender on percussion over the upper part of the motor area on the right side; the area of tenderness corresponded exactly to the situation of the leg centre and upper part of the arm centre. The knee-jerk was distinctly exaggerated on the left side. The optic discs were slightly ill-defined, but there was no very definite neuritis. There was no swelling or alteration of the scalp at the seat of the pain. Twenty grains of iodide of potassium were ordered three times a day. After taking the medicine for a week, the patient returned to say that the pain in the head was very much better, and that the leg felt stronger. He was seen two or three times after this date, at intervals of a week or a fortnight, and on each occasion he said that he was improving. When last seen, he expressed himself as being quite well; the pain in the head had entirely disappeared, but slight tenderness on percussion with the hammer could still be elicited. He had been free from spasms for a considerable time. The left leg, he said, now felt quite as strong as the right. He was strongly advised to continue the iodide.

I heard nothing more of him until one day, as I was going into the Infirmary, I happened to meet Mr Alexis Thomson, who told me that there was an interesting tumour of the brain to be seen in the post-mortem room. At the moment I did not think much about it, but after getting through my work in the wards, I looked into the post-mortem room as I was passing out of the Infirmary. I there met Dr W. J. White and Dr Leith; and I then learned that the tumour belonged to my patient the old soldier. Dr White then told me that some weeks after I had last seen the patient, the symptoms returned, and were not relieved by the continued administration of the iodide. Knowing that I had no male beds in the Infirmary, he had consequently sent the patient into Prof. Grainger Stewart's Ward. It was in this way that the case came under the care of Dr Gibson, who was not, I understand, made acquainted with the fact that I had previously been treating the patient.

I may say, in passing, that I entirely agree with Dr Gibson and Mr Alexis Thomson in thinking that, as the iodide had failed, operative procedure was called for in this case. I am further entirely at one with them in thinking that the local pain and tenderness, and the localized character of the spasms, which com-

menced in the big toe, clearly indicated that the tumour would in all probability be found on the cortex in the region of the foot centre.

The case shows that localized tenderness on the surface of the skull is not always indicative of a superficial lesion, and that in rare cases we may be entirely misled as to the position of a tumour by the pseudo-localizing symptoms which are present.

In this case no lesion of the bones, membranes, or cortex of the brain was found post-mortem; and the tumour was not, as I had supposed, syphilitic in nature. It proved to be a glioma involving the right optic thalamus; the tumour had encroached upon the posterior division of the internal capsule, apparently implicating the fibres belonging to the left leg. In this case the syphilitic nature of the tumour seemed quite clear during life, for the patient had suffered from constitutional syphilis; the symptoms undoubtedly pointed to a cortical lesion of an irritative character, and a syphilitic gumma is the most frequent cortical tumour of this kind; and the symptoms were for a time entirely relieved by anti-syphilitic treatment,—*i.e.*, full doses of iodide of potassium.

In the fourth place, in many of the cases in which the exact position of the tumour is clearly demonstrated by definite and distinct localizing symptoms, successful operative procedure is impossible or uncalled for.

(*a.*) In some of these cases the position of the tumour precludes operative interference. Tumours which are situated at the base, and tumours which involve the medulla oblongata, the pons Varolii, the basal ganglia, the deeper parts of the centrum ovale, and the corpus callosum, are obviously unsuited for operative interference.

Under this head I am disposed to include a large proportion of the cases in which the tumour is situated in the cerebellum. The surgeon can hardly hope to successfully remove tumours which involve the middle lobe of the cerebellum. Tumours which are situated in the lateral lobes are with difficulty reached, and the operation required for their removal is a dangerous one; the surgeon has to work in a very narrow space, and there is a risk of wounding the large venous sinuses and the medulla oblongata, the pons Varolii, etc. Further, it is often an extremely difficult or impossible thing to determine during life in which lateral lobe of the cerebellum the tumour is situated. For these reasons I am disposed to think that, in the present position of our knowledge, there are few cases in which a cerebellar tumour can be satisfactorily removed by operative procedure.

(*b.*) In other cases the tumour is so extensive, and infiltrates such a large area of brain tissue, that its complete removal is impossible. I have examined many gliomatous tumours of this kind after death. Of course, in many cases of this description, it

is impossible to determine the exact extent and position of the tumour until the parts are exposed during the operation.

(*c.*) In other cases the tumour is (judging from the symptoms during life) multiple; and in some of the cases in which a tumour can be removed by operation, the presence of tumours which were not suspected in other parts of the brain necessarily renders the operation unsuccessful.

(*d.*) In other cases the tumour is of a malignant character. It is obvious that secondary deposits of cancer or sarcoma in the brain are not suitable for operative interference.

(*e.*) In some cases the cerebral tumour is complicated by associated lesions in other organs which contra-indicate any operative interference. In not a few cases, for example, of scrofulous tumour of the cerebellum, tubercles are also present in the lungs. In some syphilitic cases, the vessels either of the brain or in other parts of the body are so extensively diseased that an operation is very hazardous.

(*f.*) In other cases the symptoms are relieved by treatment, and an operation is thereby rendered unnecessary. Syphilitic tumours constitute the great majority of the cases which are included under this head; and it is important to note that in a considerable proportion of the cases of intra-cranial tumour in which the new growth is best fitted for surgical interference—in which very definite localizing symptoms, such as attacks of Jacksonian epilepsy, are present, and in which the tumour is situated on the surface of the motor area, in which, therefore, it can be exactly localized and easily and safely reached—the new growth is syphilitic, and therefore more or less amenable to treatment.

In some of the syphilitic cases very brilliant results may be obtained by active drug treatment. This statement especially applies to cases which are seen at an early stage of their development. But of late years I have become more and more impressed with the belief that, although many gummatous lesions are materially benefited, and some completely cured, by anti-syphilitic treatment, the cure is often incomplete unless the case is seen and actively treated at an early stage. In syphilitic cases, a scar or cicatrix often remains after treatment on the surface of the brain, gluing the membranes to the cortex, and passing for some distance into the cerebral tissue. This scar is often an "irritative lesion," the source of chronic epilepsy, and, it may be, of ultimate dementia and insanity. I am disposed to think that in cases of this kind operative procedure should be much more frequently advised than is at present the case. The interesting case to which Mr Berry referred at the last meeting seems to me a case in point. The details are as follows:—

Some years ago, a gentleman, aged 46, was sent to me by Mr Berry, suffering from epilepsy and right-sided homonymous hemianopsia. He had had constitutional syphilis, and, several years before I saw him, had suffered from

violent headache and other symptoms indicative of a "coarse" cerebral lesion. The epileptic fits, which occurred at irregular intervals, were not preceded by any very definite aura. I was of opinion (and Mr Berry agreed with me) that there had in all probability been a gumma on the surface of the brain, possibly (because of the hemianopsia) in the region of the half vision centre; and that the scar which had resulted from this healed gumma was the source of the epilepsy. Under treatment the severity of the fits was for a time relieved, but the improvement produced by drug treatment was not marked. Under these circumstances I was strongly disposed to think that the patient should be trephined over the tip of the right occipital lobe on the chance of finding a cicatrix. A distinguished London neurologist who was subsequently consulted did not agree with this view. The operation was consequently not performed. The patient has continued to suffer from epilepsy, and his mental condition has now, I understand, become very greatly deteriorated.

While admitting the difficulty that there is in cases such as this in determining the exact position of the lesion—for hemianopsia may be due to a lesion in several different situations (cuneus, angular gyrus, optic tract at the base of the brain, for example)—I am still of opinion that an operation should in this case have been performed.

I repeat that I am disposed to think that in many of these syphilitic cases in which the gumma is of considerable size and of some standing—in which, in other words, a cicatrix must necessarily remain on the surface of the brain, even although the more urgent symptoms may be relieved by anti-syphilitic remedies—operative procedure is advisable, after the acute symptoms have subsided, under a vigorous course of iodide of potassium or iodide of potassium and mercury. I admit, of course, that in not a few cases of this kind the associated syphilitic disease of the cerebral vessels which is often present renders any operative procedure very doubtful. But the ultimate termination of many of these cases is so deplorable that some risk must be undertaken. I have seen several cases of syphilitic tumour in which, although the more urgent symptoms were relieved and remarkable improvement and apparent temporary cure resulted from drug treatment, the patients ultimately became useless members of society or insane, and had to be sent to an asylum. It is probable, I think, that in some of these cases operative interference might have been beneficial.

It is interesting to note that in two of the cases in which very large tumours have been successfully removed by the surgeon (I refer to Prof. Annandale's case and Dr Keen's case) the tumour developed as the result of an injury, and that the locality of the tumour was manifested during life by a cicatrix or depression on the surface of the skull.

These conclusions are not merely theoretical; they are based on a large clinical and pathological experience. In order to put the matter upon a definite basis so far as my own observation enables me to judge, I have taken the trouble to make an analysis of all the cases of cerebral tumour which I have had

the opportunity of seeing during life, and which I have examined post-mortem.

Analysis of Cases seen during Life.—I have notes (in many cases very incomplete) of 10,115 cases of general medical disease seen either in hospital or in private practice. Amongst these there are eighty-two cases of intra-cranial tumour = ·8 per cent. (I have only included the cases in which the diagnosis seemed to me to be reasonably certain; I have omitted all the doubtful cases, and their number is of course considerable.) This percentage does not, it must be remembered, represent the true proportion in which intra-cranial tumours occur in relationship to other diseases. I have had special opportunities of seeing cases of intra-cranial tumour, both in private and in hospital practice.

Analyzing these cases, I find that in one case a tumour was found post-mortem, the presence of which was not indicated by symptoms during life; in eighteen there were no localizing symptoms, or the localizing symptoms were insufficient to indicate the position of the tumour; in thirty-two cases (and I include in this category twelve cases of tumour of the cerebellum) the position or large extent (one case) of the tumour precluded successful operative interference; in one case the tumour was (judging from the clinical evidence, and this was verified post-mortem) multiple; in five the tumour was malignant (cancer or melanotic sarcoma) in character; in twenty cases the patients improved so markedly under treatment that operative interference was deemed unnecessary. The great majority of these were syphilitic cases. In four of them the subsequent course of events showed that an operation would perhaps have been advisable. Two of the four occurred nearly twenty years ago. In one of them the relapse which caused death was the result of a head injury.

The total result is, that in seventy-seven out of the eighty-two cases which I have seen during life, operative interference was (for one or other of the reasons mentioned above), in my opinion, contra-indicated when the patient was seen by me.

Of the five remaining cases, in two the success of an operation would, I think, have been extremely doubtful; in the three remaining cases an operation might (I think, looking back on the facts) have probably been attended with success.

Of the five cases in which an operation should, I think, have been performed, three were out-patients of the Edinburgh Royal Infirmary; two of the three were only seen by me on one occasion; one of them was admitted to the wards as an in-patient; in the third case, the diagnosis was by no means clear when I saw the patient, but the subsequent course of the case, which Dr Proudfoot of Kirkcaldy has kindly made me familiar with, seems to show that the case was one of tumour. The fourth has been published

the opportunity of seeing during life, and which I have examined post-mortem.

Analysis of Cases seen during Life.—I have notes (in many cases very incomplete) of 10,115 cases of general medical disease seen either in hospital or in private practice. Amongst these there are eighty-two cases of intra-cranial tumour = ·8 per cent. (I have only included the cases in which the diagnosis seemed to me to be reasonably certain; I have omitted all the doubtful cases, and their number is of course considerable.) This percentage does not, it must be remembered, represent the true proportion in which intra-cranial tumours occur in relationship to other diseases. I have had special opportunities of seeing cases of intra-cranial tumour, both in private and in hospital practice.

Analyzing these cases, I find that in one case a tumour was found post-mortem, the presence of which was not indicated by symptoms during life; in eighteen there were no localizing symptoms, or the localizing symptoms were insufficient to indicate the position of the tumour; in thirty-two cases (and I includ
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6	J. W.	5	M.	8	99	Six tumours, various parts.	Scrofulous.	...	1	...	1	1	...	...	Tubercle lungs.
7	A. C.	9	F.	9	102	Cerebellum.	Scrofulous.	1	...	...	1	1	...	...	Tubercle lungs.
8	J. B.	34	M.	*Medical Times*, 22/12/77		Right ascending frontal and parietal convolutions.	Cancer.	...	1	...	1	1	...	...	Meningitis; with diffusion of cancer in other organs of body.

Cases under Dr Bramwell's care during Life in the Edinburgh Royal Infirmary, and Examined by him Post-Mortem.

						No. in Table I.	Seat of Tumour.								
				O.P.	E.										
1	A. M.	4	M.	43	137	33	Intra- and extra-cerebral.	Sarcoma.	1	...	1	...	1	...	...	.....
				O.P.	E.										
2	J. G.	1½	F.	...	...	22	Crus.	Scrofulous.	1	...	1	...	1	...	...	.....
				O.P.	E.										
3	R. G.	...	M.	62	131	39	Optic thalamus.	Glioma.	1	...	1	...	1	...	...	.....

Cases in Private Practice under Dr Bramwell's care during Life, and Examined by him Post-Mortem.

1	J. M.	24	M.	P. 1	2	47	Cerebellum middle and left lateral lobes.	Glioma.	1	...	1	...	1	...	...	.....
2	A. M.	47	F.	1	170	51	Frontal lobe.	Glioma.	1	...	1	..	...	? 1	...	.....
3	A. L.	17	F.	4	215	57	Cerebellum.	Glioma.	1	...	1	...	1	...	...	.....
4	A. G.	51	F.	5	133	60	Cerebellum and medulla.	? Glioma.	1	...	1	...	1	...	...	.....
5	M. P.	21	F.	14	121	64	Pituitary body.	Sarcoma.	1	...	1	...	1	...	...	.....
6	A. K.	34	F.	28	69	74	Pons.	Glioma.	1	...	1	...	1	...	...	.....
7	J. M'D.	52	M.	24	169	73	Frontal lobe. (Immense.)	Glio-sarcoma.	1	...	1	...	1	...	...	.....
8	J. G.	40	M.	31	195	79	Base. Pons.	? Sarcoma.	1	...	1	...	1	...	...	.....
9	Mrs A.	61	F.	10	503	61	Cerebellum and lenticular nucleus.	Cancer.	...	1	...	1	1	...	...	.....
10	M. P.	...	F.	...	...	48	Cortex. Vertex.	Cancer.	...	1	...	1	1	...	...	.....
11	S. E. M.	32	F.	*Ed. Med. Journal.*		62	Many positions.	Melanotic sarcoma.	...	1	...	1	1	...	...	.....

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did a large part of the frontal lobe and the adjacent part of the motor area) that an operation would in all probability have proved fatal.

Of the twenty-eight cases which were examined post-mortem, but which had been under the care of other physicians, there was only one in which, so far as I could judge from the post-mortem appearances, the removal of the tumour could have been successfully performed.

Of course, there is a fallacy in judging of the question of successful operative procedure by the pathological conditions which are found after death; for some tumours which at the time of death are so extensive as to preclude successful removal, may, in their early stages, have been limited, and therefore capable of being cut out. I doubt, however, whether this source of fallacy affects my figures in any material degree.

Further, it must be remembered that the post-mortem evidence is in one respect much less reliable than the clinical evidence in enabling one to form an opinion as to whether a tumour could have been successfully removed during life or not; for in some of the cases of intra-cranial tumour in which the post-mortem examination shows that an operation could have been successfully performed, the clinical evidence would have contra-indicated an operation. In some of these cases there are no localizing symptoms to indicate the position of the tumour during life.

The results of my pathological experience are more fully set forth in Table II.

As the result, then, of my whole experience, I have no hesitation in saying that it is only in a very small proportion of cases that an intra-cranial tumour can be successfully removed during life.

But although it would appear that there are comparatively few cases in which the surgeon can hope to successfully remove an intra-cranial tumour, I agree with Prof. Annandale in thinking that operative procedure—trephining the skull—as a palliative remedy is often desirable. In my work on *Tumours of the Brain*, which was published now some eight years ago, I advocated, but by no means so strongly as I would do to-day, the operation of trephining for the relief of symptoms in cases in which there is great increase of the intra-cranial pressure, and in which drug treatment (purgatives, large doses of iodide of potassium, etc.) has failed. When I published that work I was not aware that Prof. Grainger Stewart, or, indeed, anybody else, had advocated the operation of trephining as a purely palliative remedy. As I have just stated, I would now go further than I did eight years ago. I believe that there are many cases of intra-cranial tumour in which palliative trephining should be carried out. In not a few cases the headache is intense, and it has been conclusively shown that in some of these cases sudden death takes place, apparently as a result of the mere

severity of the pain and sudden inhibition of the action of the heart. Dr Hughlings Jackson has directed attention to this point.

Again, in other cases in which the intra-cranial pressure is greatly increased, the patient dies either suddenly in an epileptic fit, or gradually as the result of failure of the respiration. Although, as Mr Duncan has just pointed out, it is by no means easy to establish a continuous drain of the cerebro-spinal fluid from a trephine opening, experience has, I think, conclusively shown that opening the dura mater does materially reduce the intra-cranial pressure, and does undoubtedly relieve the headache and other symptoms which in cases of this kind are the source of so much suffering to the patient, and which are so frequently the cause of death.

Further, it must be remembered that in a large proportion of the cases of intra-cranial tumour the optic neuritis is intense, and that in not a few of them the optic neuritis, if allowed to continue, passes on to optic atrophy, and produces more or less, and it may be complete, blindness. Now, it has been conclusively shown that in some cases in which the operation of trephining has been performed, both for tumour and abscess, the optic neuritis has speedily disappeared, in consequence, I believe, of the sudden relief of the increased intra-cranial pressure. I have always been of opinion that increased intra-cranial pressure is an important element in the production of the double optic neuritis which is associated with intra-cranial tumours. This view has been much disputed, and is rejected by most authorities. But I still maintain that increased intra-cranial pressure is a most important factor (I do not say that it is the only factor—see *Intra-cranial Tumours*, page 44, where I have discussed this point in full) in the production of the condition. The disappearance of the optic neuritis after the operation of trephining goes, I think, far to prove the correctness of this view. But the practical point which I would now urge is, that palliative trephining may prevent the development of post-neuritic atrophy and permanent blindness.

I may take this opportunity of saying, that in many cases of lead poisoning in which cerebral symptoms are prominent—cases of lead encephalopathy, as they are technically termed—trephining, with the object of relieving the optic neuritis and preventing post-neuritic atrophy, is also, I think, indicated. During the time that I practised in Newcastle I had frequent opportunities of seeing cases of this description. There are large white-lead manufactories at Gateshead, and severe cases of lead encephalopathy were frequently admitted to the Newcastle Infirmary. Some of these cases died; in many of the cases which recovered the eyesight was permanently damaged; in some so markedly damaged that the patient was practically useless through the blindness which was produced. Since coming to Edinburgh I have seen no cases of lead encephalopathy; but of late years I have come to the

conclusion that the operation of trephining in some cases of this description for the prevention of post-neuritic atrophy and subsequent blindness is probably a justifiable and advisable procedure. Further, it is not at all improbable, I think, that in some cases of lead encephalopathy the operation may not only relieve the optic neuritis and prevent blindness, but that it may prevent death itself.

Again, Prof. Victor Horsley believes that in some cases the operation of trephining and the removal of a portion of a cerebral tumour produces a retarding influence upon the development and growth of the portion of tumour which remains. But whether this is so or not, the operation in many cases makes the life of the patient much more comfortable and bearable. I am of opinion, then, that in many cases of intra-cranial tumour in which the conditions seem to contra-indicate the successful removal of the tumour, the operation of trephining and opening the dura mater should be performed.

Further, it must be remembered, firstly, that the diagnosis as to the exact position and connexions, the size and pathological nature, of an intra-cranial tumour, is often a matter of much uncertainty during life; and, secondly, that in almost all cases in which the symptoms are not relieved by large doses of iodide of potassium or iodide of potassium and mercury, the disease proves fatal, and often rapidly fatal. Under such circumstances, if the locality of the tumour can be even approximately determined (if, for example, it can be determined that it is situated in the right or left hemisphere), and if there is a reasonable probability that it can be safely reached, operative procedure is justifiable. Even although the surgeon does not think that the case is one in which the tumour is likely to be successfully removed, he is not, in my opinion, justified in refusing to operate if the patient or his friends desire him to do so. There are many desperate cases of this kind in which one may hesitate to urge and press an operation, but in which, if the patient desires an operation, he should be allowed the benefit of the doubt. In cases of this kind the decision should, I think, be left to the patient and his friends. The facts should be fully and fairly placed before them, and they should be left to decide whether the operation should be performed or not. It is always possible that the diagnosis as to the position and extent and pathological character of the growth may be mistaken. It is possible (though the reverse is much more likely to be the fact) that in some of the cases in which the clinical conditions seem to preclude successful removal it may be found possible, when the parts are exposed, to successfully remove the growth. Further, the operation does not materially add to the danger of the case. In fact, in many cases it materially relieves suffering, prevents blindness, and prolongs life. For all these reasons I am, after mature consideration, disposed to think that in many cases of intra-cranial tumour trephining ought to be

performed; although I repeat that I am fully persuaded, both from my clinical and pathological experience, that the cases in which an intra-cranial tumour can be completely and successfully removed by the surgeon are, relatively speaking, very rare.

Let me now briefly refer to some of the other conditions which come under the care of the physician in which trephining is indicated.

Epilepsy.—In considering this question it is very advantageous to divide cases of epilepsy into the following groups:—

(*a.*) Cases of traumatic epilepsy in which there is a distinct scar or depression on the surface of the skull, and in which the epileptic discharge begins in the portion of brain tissue (grey matter) which is situated immediately under the seat of the external injury. In these cases the operation of trephining is clearly indicated. These are the cases of epilepsy in which the surgeon may expect to obtain the best results from operative interference. Under this head I may refer to a most instructive and interesting case of Jacksonian epilepsy due to the presence of a small spiculum of bone which pressed upon and irritated the centre for the platysma muscle. In that case there could be no question that an operation would have saved the life of the patient. Unfortunately, an operation was not performed. At the time when the case came under my notice, now nearly twenty years ago, surgeons were loth to open the cavity of the cranium. The question of operation was, as a matter of fact, considered at a consultation with one of the surgeons to the Newcastle Infirmary, but it was decided, as the patient was improving, to defer the operation for a time. Unfortunately, the patient died two days after the consultation. The case is published in the *British Medical Journal*, September 1, 1877.

In cases of this description the operation is most clearly indicated when the scar or depression is situated over the motor area in which the spasm commences, as it was in the case to which I have just referred. In those cases in which there is a scar or depression on the surface of the skull, and in which a general epileptic fit is preceded by an aura which does not consist of a localized spasm, but which is sensory in character, the operation is less likely to be successful; for, even although the aura (which is indicative of the commencing discharge) seems to have its starting-point in the portion of grey matter immediately below the seat of the injury, there are more sources of fallacy than when the first indication of the fit is a localized muscular contraction or spasm.

(*b.*) Cases of traumatic epilepsy in which a depression or scar is situated on the surface of the skull, and in which localized spasms or an aura of some kind or another, show that the epileptic discharge begins in a definite area of the brain cortex, the portion of grey matter which is first discharged does not correspond to (immediately underlie) the position of the external injury. In these cases the operation is much less likely to be successful; but

when drug treatment has failed, operative treatment is, I think, called for. But the question arises whether the surgeon should trephine at the seat of injury represented by the external cicatrix or over the area of grey matter which is first discharged at the commencement of the fit. Whether the fit has its starting-point in some irritation below the scar or depression, can only be decided by actual observation. I am disposed to think that in cases of this description the surgeon should first trephine over the position of the scar or depression, and then, if no source of cortical irritation is found in that situation, that a second portion of bone should be removed over the area of grey matter which is first discharged in the fit.

(*c.*) Cases of traumatic epilepsy, in which a scar or depression represents the position of a former injury to the skull, but in which the epileptic fits begin with a general discharge, *i.e.*, without any localized spasm or definite aura. In these cases the trephined opening should, of course, be made at the seat of the injury. In cases of this kind the operation is an experimental one, and is rarely, perhaps, likely to be attended with success. In such cases, where no source of irritation is found beneath the external cicatrix, it is useless, I think, to proceed further; there are no indications to warrant the surgeon in making a second exploratory incision. A case of this kind, in which Mr Caird performed the operation, is fully reported in my *Clinical Studies*, page 331.

Under this head we should also include those cases of traumatic epilepsy in which there is a scar or depression on the surface, and in which general epileptic convulsions occur without any definite mode of commencement or warning, and preceded by an aura of an indefinite kind, such as a feeling of something rising from the stomach to the head,—a feeling of fear, palpitation, and the like.

(*d.*) Cases of idiopathic epilepsy, *the* disease epilepsy (and I exclude from this category cases in which the epileptic fits are the result of a "coarse" lesion, such as a tumour or abscess, and in which the epilepsy is symptomatic of such general conditions as Bright's disease, lead poisoning, and the like), in which the epileptic fits always commence with a localized spasm, or with a definite aura which is constant in character and which definitely indicates the position of the area or centre of grey matter which is first discharged. In these cases the operation of trephining should also be performed, provided that drug treatment has failed to give relief. In cases of this kind the mode of commencement of the spasm or the character of the aura is the guide to the position of the grey matter which is first discharged. The guide is far more certain in those cases in which the aura consists of a localized spasm than in the more numerous cases in which it consists of some sensory disturbance, such as a painful sensation in a localized part (say, the tip of the forefinger), a flash of light in the eyes, a bad smell in the nose, a bad taste in the mouth, etc. Dr Hugh-

lings Jackson was, so far as I know, the first to point out that in cases of epilepsy in which the discharge invariably begins in the same localized area of grey matter, the affected portion of grey matter should be cut out,—provided, of course, that drug treatment has failed to give relief.

(*c.*) Cases of idiopathic epilepsy in which there is nothing to show that the epileptic discharge commences in a localized area of the brain,—*i.e.*, in which there is no localized spasm at the commencement, no definite aura, or in which the aura is of a general (non-localizing) character, such as an indescribable feeling in the stomach or elsewhere, a feeling of fear or the like. In these cases (and under this head may be included many cases in which the epileptic condition is said or thought to have resulted from a blow or fall on the head, but in which there is no external evidence, in the form of a cicatrix, of the injury) the results of operative interference are very unsatisfactory. This, I suppose, is the experience of almost all observers. In cases of this description the operation should only, I think, be performed when medicinal treatment has been thoroughly tried and failed, and when the conditions are desperate,—in cases, for example, in which the frequent recurrence of the fits unfits the patient for the ordinary duties of life, is producing great mental deterioration or actual insanity. I have frequently been consulted in cases of this description, and I have invariably left the decision, as regards the question of operation, to the patient or his friends. The position I take up is this:—That drug remedies having failed, the disease is likely to continue and the mental deterioration to become worse rather than the reverse; that the operation is attended with little risk to life; that it may perhaps give some temporary relief; but that it is not, so far as my experience enables me to judge, likely to produce any permanent benefit. In short, in this class of cases the operation is purely an experimental one; and, so far as my information enables me to judge, an experiment of a very doubtful kind.

Experimental Operations.—As Prof. Annandale has said, there are many cases in which the question of an experimental operation has to be considered. In many cases of brain disease the diagnosis is necessarily more or less doubtful. In many cases it is impossible to say, without opening the skull, whether there is anything which can be removed or reached. In cases of this kind, when drug treatment has been thoroughly tried and failed, when the condition of the patient is desperate, when life, as it often is in such cases, is hardly worth living, we are warranted, I think, in risking a good deal (but in trephining the risk is not great), and in advising that an experimental operation should be performed in the hope that the operation may give relief. Several cases of this description have come under my own notice. There is one at present in the Infirmary, which I very recently passed on to Mr Cotterill. The details of the case are as follows:—

A. B., aged 15, female, was admitted to Ward 27 on the recommendation of Dr Thomson of Musselburgh, suffering from left hemiplegia, loss of vision, and marked mental deterioration. The history which was obtained was that the patient was in good health, fairly intelligent, and able to read and write eight months ago, when she was admitted to the Inveresk Poorhouse. Three months after her admission to the Poorhouse (five months ago) she began to complain of pain in the head, and became weak.

On admission to the Infirmary the left arm and leg were found to be paralyzed and rigid (the right leg was also to some extent affected), and the mental condition markedly deteriorated. The patient lies curled up in bed, with the knees drawn up. She seems to understand some things which are said to her, but gives no intelligent answers to questions put to her, and does not volunteer any spontaneous speech utterances. When examined or spoken to she cries out—the clinical clerk who took notes of the case says—"like a cat." She passes her evacuations under her. She frequently puts the right hand to the right side of the head and moans as if from pain. Sight seems impaired. The optic discs are distinctly atrophied.

Now, in this case the diagnosis is by no means clear. Dr Thomson assures me that there is every reason to believe that the patient is the subject of inherited syphilis, but whether the cause of the symptoms is a localized syphilitic growth (gumma), or, as is much more likely, a more widespread syphilitic degeneration, or both, it is (chiefly owing to the inability of the patient to describe her symptoms) impossible to say. It is not unlikely that both morbid conditions may be present. So far as I can judge, there is no prospect whatever of the patient improving under any kind of medicinal treatment. Iodide of potassium and mercury have been tried in full doses for several weeks without any benefit whatever. Under such circumstances it is, I think, quite justifiable to perform an experimental operation; and it was with this object that I transferred the case to Mr Cotterill's care. There is nothing to show definitely that the lesion is situated on the surface of the brain; it is certain, however, that the motor tract passing from the right hemisphere is implicated in some part of its intra-cranial course. Possibly a lesion on the surface of the motor cortex may be found, though I must say I think the chances are against the presence of a removable tumour, and it is on the chance of finding such a lesion that I have advised an experimental operation in this case.

Another case in which the indications for operation seem to be more clear is that of a girl whom, as it happens, I sent to Mr Cotterill to-day. She has been under observation for the past year. She suffers from right-sided hemiplegia, which dates from early life, epileptiform convulsions, and mental deterioration. During the last few years her fits have increased, and her mental peculiarities and defects have become much more marked. Many months ago the question of trephining was considered; in fact, it was then arranged that she should be admitted into Mr Cotterill's Ward in order to have the operation performed, but at the last moment her parents objected. She has lately become so much worse and so unmanageable, that they are now anxious that some-

thing should be done. As their clergyman, who came to see me about her the other day, says, she can no longer remain at home; unless something is done to relieve her, she must be sent to an asylum. Further, he pointed out to me that in her present condition her life is not worth living. She is not only a burden, but a troublesome burden, to her friends; and her mental deterioration is so great that she can hardly be looked upon as a reasonable human being.

In this case, which in some of its features resembles that which Dr Gibson has brought before us this evening (Dr Felkin's successful case of trephining), the indications for operation are much more clear than in the last case; for we know, as a matter of experience, that in most of these cases of hemiplegia dating from early life, in which convulsive seizures are subsequently developed, the lesion is cortical in its seat. It is probably only in rare cases that an operation will be attended with such marked success as in Dr Felkin's case; for in many cases the cortical tissue is sclerosed and irretrievably atrophied and damaged. But there are fair grounds, I think, for supposing that in a certain, though it may be only small, proportion of these cases the severity of the epileptic attacks will be restrained, or the fits perhaps altogether arrested, by surgical operation removing a cicatrix which is a source of irritation, or cutting out a portion of the motor area. (As Mr Cotterill pointed out in his remarks, the patient is already hemiplegic; the risk of producing paralysis need not, therefore, weigh so heavily against an operation in this case as it would in a case of epilepsy in which there was no paralysis.) Further, it should be remembered that unless a large portion of the motor area is removed, the risk of the production of permanent paralysis is probably not so serious as was at one time thought. It seems certain that in many cases a considerable and satisfactory amount of compensation is developed. In many cases (cases in which the position of motor grey matter which is removed is small) the resulting paralysis is only temporary.

In a case of infantile hemiplegia and epilepsy which I saw with Dr Thin about two years ago, and which was subsequently admitted into the Infirmary and trephined by Mr Wallace, the operation has been undoubtedly beneficial. In that case no lesion was found on the surface of the motor cortex.

In another "experimental case" which Mr Caird trephined some years ago, the operation undoubtedly gave relief. The patient suffered from severe headache and other symptoms, which I need not occupy time by detailing in full. He had been seen by Dr Hughlings Jackson, who was of opinion that there was either a "coarse" lesion, or that the case was an unusual and peculiar form of megrim. Dr Jackson seemed to favour the former supposition, as Mr Caird and I were inclined to do. But the experimental nature of the operation was fully recognised by us all. No lesion was found; but, as I have already said, relief was obtained.

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in my *Atlas of Clinical Medicine*. Looking back on the facts of that case, an operation ought, I think, to have been performed, but for several reasons, which I need not now specially mention, this seemed a doubtful proceeding at the time when I saw the patient. The fifth case was a clear case for operation,—not, however, when I saw the patient, for at that time the lesion was in a very early stage, and the diagnosis was attended with considerable uncertainty. In a sixth case, which was seen with Dr Struthers of Leith, and has been published in the *Edinburgh Medical Journal*, the question of operation was discussed, but rejected, partly because the diagnosis at the time of the consultation was by no means certain, and partly because of the peculiar mental disposition of the patient,—she would not hear of anything being done.

These conclusions will be more fully understood by reference to Table I.

From these statements it will be seen that the proportion of cases in which, judging from the clinical evidence, a tumour of the brain is likely to be successfully removed by surgical interference, is very small. It is possible that my experience may have been exceptional, and that I may have been unfortunate in meeting with such a small number of cases in which the tumour was capable of being removed successfully by the surgeon, but my figures are large; and my main conclusion seems entirely corroborated by the fact that Prof. Annandale, with his immense experience both in private and hospital practice, has only been able to bring one case before our notice, and that none of the other surgeons who have taken part in the discussion have been able to tell us of any successful cases. No doubt, if there had been any other successful cases we should have heard of them.

Further, this clinical experience is entirely corroborated by the pathological experience which I have gained from the examination of cases of intra-cranial tumour after death. Of the above eighty-two cases which I have observed during life, twenty-two were examined post-mortem. Further, during the time that I acted as pathologist either to the Newcastle Royal Infirmary or to the Edinburgh Royal Infirmary, I had the opportunity of examining twenty-eight cases of intra-cranial tumour which had died under the care of other physicians.

Of my own twenty-two cases, the successful removal of the tumour during life would, judging from the conditions found after death, have been impossible in seventeen; in the remaining five cases the tumour might probably have been successfully removed had its position been diagnosed and an operation undertaken. But in three of these five cases operative interference was precluded by the fact that there were no localizing symptoms. In one the patient completely recovered for a time under treatment, the symptoms subsequently relapsing after a fall from a considerable height. In one the tumour was so extensive (involving as it

always unattended with danger. In a case which Mr Cotterill and I have recently had under treatment, the operation was followed by death. The case was one of tubercular meningitis.

Trephining in Tubercular Meningitis.—For some years past I have suggested in my lectures that the operation of trephining may possibly be useful, and should certainly be tried as an experiment in cases of tubercular meningitis. This suggestion was based on the fact that tubercular peritonitis has, as is well known, been in many cases cured by opening the abdomen. Why simply opening the abdomen should produce immediate benefit, and in some cases complete cure, of a tubercular peritonitis, we do not as yet know. Whether the beneficial result is due merely to the entrance of air or to the relief of the pressure and evacuation of some of the peritoneal fluid, is as yet undetermined. The latter seems the more likely explanation, and in tubercular peritonitis continuous drainage with aseptic precautions is probably the proper treatment; but it must be remembered that in some of the cases in which the operation was beneficial the abdomen was immediately closed. In some of the cases no continuous drain was established. But be this as it may, there can be no doubt as to the fact—the benefit which results.

Now, although in rare cases tubercular meningitis is recovered from, the disease is almost invariably fatal. Any plan of treatment, therefore, which seems to hold out even a possibility of success deserves a trial. These are the grounds on which, as it seems to me, the operation of trephining deserves a trial in cases of tubercular meningitis. The same idea has no doubt occurred to many minds. In the year 1888 an American surgeon, Mr Keen, advocated the operation in print, and published minute directions as to the best method of tapping the ventricles.

Now, if the operation is to be attended with success in tubercular meningitis, it must, I think, be performed in the early stages of the case; it cannot be expected to effect a cure when the disease is far advanced. Merely tapping the ventricles for the relief of intra-cranial pressure in the later stages of the disease—the plan which I understood Dr Carmichael to advocate at the last meeting—may perhaps be useful as a palliative measure, but is not likely to arrest the progress of the disease, or to cure the condition, and this is the object of course which has to be arrived at. The details of the case are as follows:—

Case of Tubercular Meningitis; Trephining; tapping the Lateral Ventricle; Death.—H. S., aged 19, was admitted to Ward 5A on 11th February 1894, suffering from headache and vomiting and other symptoms suggestive of commencing meningitis.

Previous History.—The patient was in her usual health until the beginning of January. About that time she began to complain about pain in the left shoulder, which was put down to rheumatism. This pain lasted for a fortnight, and necessitated the patient remaining in bed. It then entirely disappeared, and she felt quite well until a week later, when she began to

suffer from headache and vomiting, both of which have continued up to the present time. The vomiting occurred both immediately after, and independently of, taking food. The headache was referred to the frontal region. A week before admission the symptoms became so bad that the patient had to take to bed. The pain has prevented her sleeping of late. Yesterday she wandered slightly. No squint was observed before admission.

The patient suffered from a running ear in childhood; which side not known. It occurred after measles. She has also had scarlet fever.

Family History.—The patient is the fourth in a family of eleven. Two girls are dead—one in infancy, the other shortly after birth. One brother suffers from a weak chest (cough, sweating, loss of flesh). One sister suffered for many years from a running ear. The mother died of erysipelas. The father is healthy.

Condition on Admission.—The patient is in a stupid, semi-comatose condition. Temperature 100°; pulse 90; respirations 24. The pupils were contracted and equal; light seems to hurt the eyes and to aggravate the headache. There is slight nictitation. The tongue is furred. The pain, which is chiefly referred to the forehead, is also felt all over the head. The optic discs are normal. The heart and lungs appear to be normal. There is no pain or tenderness over the abdomen, but there is slight gurgling in the right iliac fossa. The abdomen is not distended; in fact, rather the reverse. The bowels are constipated. There has been no influenza in the house from which the patient has come.

Ordered quinine three grains, and antipyrin ten grains, every three hours; also a dose of cascara.

February 12th.—Some wandering last night. This morning the patient lies in a listless, drowsy, semi-comatose condition. Slight internal strabismus of the right eye. The right pupil is a little smaller and more active than the left, which is moderately dilated. When roused, the patient complains of headache. No twitching has been noticed in the facial or other muscles. No cough. *Tache cerebrale* very marked over the abdomen. The abdominal reflex is much more active on the right than on the left side. The plantar reflex is also more active on the right than on the left side. The knee-jerk is more active on the left side. Bowels well opened through the night; the motion was formed and quite normal. Temperature still elevated. The ears seem natural.

Ten grains iodide of potassium every four hours.

February 13th.—Had a fairly quiet night; is rather more sensible this morning; complains of pain all over the head. There is distinct loss of power in the left arm and leg; voluntary movements of the left arm and leg are attended with tremor. The knee-jerk and plantar reflex are absent in the left leg, active in the right.

The case seems without doubt to be one of meningitis, in all probability tubercular. The strabismus is much more marked this morning. The optic discs are still normal.

After consultation with Mr Cotterill it was decided to trephine if the relatives consented. The relatives did consent, and the operation was performed.

An opening was made into the right side of the head in the parietal region, just behind the motor area. On removing the disc of bone, the membranes bulged very distinctly through the opening, but did not pulsate. On opening the dura, the cerebral substance bulged so much through the opening that it formed a hernia. The exposed portion of the membranes appeared perfectly normal. The brain did not pulsate. A fine trocar and cannula was introduced downwards and forwards with no result. A second exploratory puncture was made more downwards and inwards to the distance of 1¾ inch from the surface. When the trocar was withdrawn a jet of clear cerebro-spinal fluid escaped with much force. It spouted out for fully 9 inches or a foot. Some of the fluid was lost; we reckoned that 3 oz. at least escaped. As the tension of the cerebro-spinal fluid in the ventricles was evidently very

great, we decided to leave the silver cannula *in situ*. The disc of bone was therefore split in two and the cannula left between the two portions. The wound was then closed in the ordinary way. The patient never regained consciousness. The paralysis in the left arm and leg seemed to be more marked after the operation. Death took place at 4 A.M., fifteen hours after the operation.

The post-mortem examination was made on February 16th. The wound was absolutely healthy.

On removing the calvaria, distinct evidence of increased intra-cranial pressure was present; the convolutions were flattened and the sulci effaced, but not to a marked degree. At the base, round the optic chiasma and over the intra-peduncular space as far back as the pons Varolii, there was distinct evidence of commencing meningitis, in all probability tubercular. The track of the wound which the cannula had made down to the lateral ventricle was absolutely healthy. The lateral ventricles were collapsed. A black clot, the size of a small almond, was found in the right lateral ventricle; there was no clot in the fourth ventricle. The choroid plexus and membranes passing out of the transverse fissure were deeply injected, and apparently in a condition of commencing meningitis. There were no distinct tubercles visible to the naked eye. The spinal cord and its membranes were healthy. The parts have not yet been examined microscopically. The other parts of the body were not examined; it was with difficulty that permission was obtained to examine the head.

The result in this case was unfortunate. The exact cause of death was not clear. But notwithstanding the unfortunate result in this particular instance, for the reasons I have already given I am still disposed to think that the operation (trephining and continuous drainage) deserves a trial in tubercular meningitis; and I repeat, if the operation is to have any chance of success, it ought, in my opinion, to be performed in the early stages of the disease.

Trephining in Cerebral Hæmorrhage.—I have seen several cases of cerebral hæmorrhage in which I think the relief of a rapidly increasing intra-cranial pressure (which speedily proved fatal) might possibly, for a time at least, have warded off the fatal result; but I doubt if the cases in which the operation is likely to be successful are numerous. Cases of this kind are generally seen in private practice; their course is often rapid; no surgeon is at hand; and the conditions for operation are therefore either unfavourable or altogether impossible. I am speaking, of course, entirely of non-traumatic hæmorrhage. In these cases the hæmorrhage is of course, in the vast majority of instances, intra-cerebral. I have seen several cases in which a large hæmorrhage was evidently steadily progressing in the interior of the brain, producing deeper and deeper coma, greater and greater embarrassment of the respiration and of the reflexes, and in which all at once spasmodic contractions or other symptoms indicative of a sudden burst into the lateral ventricle occurred. It is perhaps not too much to hope that in some cases of this kind tapping the hæmorrhagic cavity might prevent the rupture into the ventricle and possibly ward off death.

Another case in which the operation of trephining might

perhaps have prolonged the life of the patient and possibly have prevented death, was one which I saw some years ago with Dr Milne Murray. In that case we saw the patient gradually die before our eyes from an increasing intra-cranial pressure, which was clearly due to a hæmorrhage on the surface of the brain.

The post-mortem showed that the diagnosis was correct. The hæmorrhage had resulted from the rupture of an aneurism of the middle cerebral artery, deep down in the fissure of Sylvius. It is doubtful whether in this particular case trephining would have prevented death; but it is certain, I think, that if it had been possible to trephine and relieve the pressure, the fatal issue might have been postponed. In this, as in the great majority of cases of meningeal hæmorrhage of spontaneous origin (I do not of course refer to cases of pachymeningitis hæmorrhagica), the course of the hæmorrhage was so rapid that an operation was out of the question. The full notes have already been published in the *Edinburgh Medical Journal.*

Dr Batty Tuke said what, perhaps, had impressed him most in this discussion was the manner in which most of the speakers accepted encephalic pressure as a postulate; using the word in the geometrical sense, as a proposition assumed without proof. Of course, he alluded to pressure produced by other causes than abscess, hæmorrhage, or rapidly growing tumours. They heard fluid "pressure" spoken of without reference to its cause, its amount, its locus, or its phenomena. They were even advised to operate for its relief on the chance that it was present; and they were advised only in one direction for the relief of an assumption, viz., trephining. Fluid pressure was not a postulate. It was the x to be determined in the equation presented in every head-case in which they were not certain of the existence of tumour, abscess, or blood-clot. It might be admitted that in every such equation many of their factors were undetermined, and that the result of their labours could in consequence only produce an empirical expression. Still, the attempt to work out such equation brought into prominence certain facts which threw a certain amount of light on the whole subject. They were all aware of the errors which arose from the acceptance of the theory that the skull and its membranes formed a practically closed sac. Were it so, no change in the volume of blood within the brain would be impossible. They knew, however, as a fact, that considerable changes take place in the amount of the brain blood supply under various conditions, and that pressure occurred in consequence of exudation produced at a greater rate and in larger quantities than could be removed by the lymphatics at the base and in the spinal column. In the cases in which he had recommended drainage by operative measures—general paralytics —obvious indications of pressure had been present; for when the disc of bone was removed the dura bulged much further

into the hole than was observed in traumatic cases where trephining was performed for the relief of local pressure, and in which inflammation, if it existed, was confined to limited areas. In two cases the protrusion filled the hole, as far as a cone could, and rose to the level of the outer surface of the skull. In all the seven cases he had seen operated on a layer of fluid was distinctly noticeable existing between the arachno-pia and the true pia, varying in different cases, but always detectable by the finger. In four early cases the pia was distinctly congested, presenting the same differences of appearance as was observed (let him say) between a normal and an inflamed conjunctiva or peritoneum. Discrimination was as easy in one case as the other. He thought he might call on Mr Duncan to confirm these observations, for he performed the operation in three of these cases. He held, therefore, that having introduced pyrexia, congested pia, effusion to the extent of producing bulging of the dura, he had introduced factors into *his* equation by which he was able to bring out the x as pressure due to inflammatory agency. He held that as regards any other organ these factors would be accepted as indicative of inflammation. To discuss the question thoroughly it would be necessary to open up the whole subject of the pathology of general paralysis. Although there was no one it was easier to agree to differ with than the President, he did not desire to come into conflict with him on the present occasion, for their views on the subject were widely divergent. All he claimed was that in four early cases presenting the appearances just related, and who were the subjects of the congeries of symptoms which characterize what we call general paralysis, the operation of trephining for the relief of pressure was not only justifiable, but was justified by results. Not only in these four cases, for operation on which he was, directly or indirectly, responsible, but in three others he had seen operated on, and in all he had read of, *immediate relief* was obtained from the intensity of symptoms. He would let Dr Macpherson speak for his cases—confining himself to his own. So long as drainage could be maintained the mental and physical symptoms markedly—very markedly—abated. Time did not permit him to enter into the details of this improvement; he must ask them to accept the general statement that improvement did take place. In the last case he saw operated on by Mr Duncan complete recovery ensued. The man presented all the well-known physical symptoms,—his memory had failed in the characteristic manner in which it fails in general paralytics, and he complained of stupidity and headache. He had no grandiose delusions. His was a very early case. Omitting certain interesting details connected with the operation which had no bearing, he thought, on the present discussion, it might be said that improvement, gradual at first, and then rapid, took place, till, after six weeks had elapsed, he felt so well that he insisted on going home. There he kept well for three months; then took to drinking, which had always been

his habit, and died in a fit of delirium tremens. This was the best result he had seen obtained from the operation; for scientific purposes it was a recovery. Clay Shaw reports a somewhat similar case, the marked difference between his and Mr Duncan's being that the patient was the subject of large delusions. These and all other symptoms, except slight dulness, disappeared after operation; the man was so well that he obtained employment as a ticket-collector on the railway, but could not retain the situation on account of the dulness, which was persistent. Now, he asked, was it not of considerable importance physiologically, pathologically, and psychologically, to have shown that such marked symptoms as delusion and other mental symptoms, and paralytic symptoms might be removed by draining the membranes of the brain. He held that this was a very important preliminary fact which had been brought out by the employment of the operation. The surgeon had assisted the physician in arriving at this clinical fact—he must now assist him further. As he had said, improvement in most cases ceased a few days after the wound had healed and drainage had ceased. It was for the surgeon to devise measures by which this drainage might be maintained. Sepsis was the great difficulty in the way. He had suggested laminectomy in the lumbar region, that being the most dependent point of the cerebro-spinal drainage system. But he was told the danger of sepsis was greater there than in the skull. Prof. Annandale had told them that trephining at the base was not a difficult operation. If we could get an opening into the cisterna cerebello-medullaris, and provide for *slow and gradual* drainage, the next great step in operation for the relief of general paralysis and other head affections would be gained. *One drainage point was sufficient*, for he had observed in all the operations at which he had been present, and in which an opening was made in each parietal bone, that when the wound on one side was temporarily closed in order to proceed with a similar operation on the other, if the arachno-pia was opened on the side last operated on, on inspecting the membrane in the side first opened, it not having been previously touched, the pia was found to be drained. He had the conviction that drainage should be slow and in small quantities; for the probability was the actual mechanical pressure was not very great in amount, and that the removal of a very small quantity of fluid would relieve it. Was he wrong in saying that the best results have followed the slow drainage of other serous sacs? One word as to the cases which should be selected for operation:—1*st*, Recent cases,—cases in which complication of brain tissue consequent on inflammation have not, in all probability, gone far; 2*nd*, cases in which headache is well marked; 3*rd*, cases in which the evening temperature reaches 100° or upwards. The cases in which it was contra-indicated were those of syphilitic origin, in which, from their presenting a variety of nervous symptoms other than insanity, such as local paralyses, they had reason to believe that

the immediate cause was arteritis. In others, however, in which general constitutional symptoms had been present, and in which there was great headache, the procedure was, he thought, admissible.

Dr Ireland said that the same success in the treatment of general paralysis by trephining as was obtained by Dr Batty Tuke had not been recorded by other operators, as far as he had noticed. He did not think that it was likely that general paralysis would be cured in this way. With regard to microcephalus, he had happened lately to go over the recorded cases that had been operated upon, and he thought it was too much to maintain, as Prof. Annandale had done, that the treatment was attended with fair success. In twelve operations there were four deaths, and improvement was claimed in two cases. Voisin reported that Lannelongue had operated in twenty cases, but no intellectual amelioration had followed. Some of the operators did not seem to be quite aware of the pathology of microcephalus. In many cases there was really no closure of the sutures, as had been supposed.

Dr Clouston said that in regard to the interesting results gained by operation in general paralysis, he could only say that as it was hitherto an absolutely hopeless disease, he had no objections to the surgeons doing any kind of operation. But from his views of the essential nature of the disease, and looking to its pathology and the course of all recorded cases, he was most sceptical as to any possible cure from any kind of operation whatever. He did not agree that the two cases reported by Dr Clay Shaw and Dr Batty Tuke were in reality cures, even if they were cases of general paralysis at all. In the diagnosis of early general paralysis they were all apt to make mistakes. He found that in at least two per cent. of his cases a wrong diagnosis was made. Certain syphilitic and alcoholic causes were often regarded for a time as general paralysis. With regard to the improvements recorded after operation, he did not think they were any more decided than they saw in ordinary cases of general paralysis that were left to themselves. They saw such short improvements in a great many cases. At Morningside he found he was in the habit of discharging, as recovered, many cases of general paralysis. The symptoms so disappeared that the patients were regarded as not insane. But they invariably came back in a short time. He was absolutely sceptical as to the existence of excessive pressure at all in general paralysis, except, perhaps, the kind of pressure that hyperæmia produced. As regards the contested question as to whether the fluid under the arachnoid meant pressure or not, he held that it meant want of pressure, and was merely compensatory after the brain had undergone atrophy. Others said it meant excess of pressure. With regard to general insanity, there was

one class of case which he was quite certain could be cured if they could make the diagnosis. He had seen a number of cases in which spiculæ of bone were found post-mortem attached to the falx or the arachnoid, or to the inner side of the dura. Such spiculæ occurred in cases of great intensity,—cases of mental epilepsy. Few of them had convulsions. He had no doubt that the irritation of those spiculæ of bone had caused the irritation of the mental centres, and at last had caused the death of the patients. If they could diagnose these morbid growths of bone, and remove them, they would probably cure the insanity. He thought that in certain otherwise incurable cases of mental disease, trephining might be the best means of counter-irritation that could be applied. In curable cases, however, they were not justified in appealing to the surgeons until they could warrant that the operation would be perfectly free from danger to the patient's life. He had recently had an interesting case at Morningside, in which Mr Wallace had trephined. The patient was a man of middle age. There was a history of a fall, and he had had syphilis. Many of his symptoms were those of general paralysis, but his speech was not characteristic. He had attacks of convulsions, which always began in the forefinger of the right hand. The operation, unfortunately, was followed by no improvement. Indeed, the patient became more maniacal. Intercurrent hæmorrhage occurred, and he died within a week. In order to make the diagnosis certain in such cases when operated upon, he recommended that a small piece of the cortex should be removed and microscopically examined. This had been done in this instance, and the diagnosis of general paralysis was confirmed before the surgeon had completed the operation.

Mr Cathcart moved the adjournment of the discussion, which was agreed to.

Meeting VI. (Adjourned)—February 23, 1894.

Mr Joseph Bell, *Ex-President, in the Chair.*

The Chairman explained that the meeting was for the continuation of the discussion upon intra-cranial surgery, and the demonstration of specimens bearing on the subject.

I. Exhibition of Patient.

Dr Smart showed a woman who had been TREPHINED for BASAL CEREBRAL HÆMORRHAGE, and whose case had been referred to at the first meeting of the discussion.

II. Discussion on Intra-cranial Surgery—*continued.*

Prof. Chiene made the following remarks, and demonstrated his Method of ascertaining the Relations of the Cerebral Convolutions to Scalp Surface:—

It was my privilege in 1890 to take part in a discussion in America similar to the present. In the remarks then made I gave a typical series of cases (fractures, ear disease, compression, epilepsy, tumours, hæmorrhages), which are fully reported in the 9th vol. of the Transactions of the American Surgical Association. Seeing, then, that I have no reason appreciably to alter the conclusions then arrived at, and as these cases with my remarks are before the members, I think I will, with most advantage, mainly occupy the time at my disposal this evening by describing a simple means of localizing the different portions of the brain.

Before, however, I enter on this, I may shortly state the views which I at present hold in regard to intra-cranial operations.

I have had experience in epilepsy, inflammation, abscess, tumours, and hæmorrhage.

In *epilepsy* I have only seen marked good arise from operation in cases of a distinctly traumatic origin, and particularly in cases in which the injury involved the motor areas in the neighbourhood of the fissure of Rolando. In one case I believe that the failure in giving relief was largely due to an insufficient exposure of the brain. In connexion with this remark I am of opinion that one of the main improvements in the future will be in the direction of more extensive removal of the calvarium. Hernia cerebri has been robbed of its chief terrors by asepsis.

In *tumours* the relief has only been temporary, but my experience in these has been unfortunate, as I have never yet had a distinctly encapsulated tumour to deal with.

In *abscess* I have had to deal with frontal and temporo-sphenoidal cases. In frontal abscess I have been misled by the absence of all definite symptoms, and have not operated when I should have done so. In the future I will lay more stress on the slowness of the pulse as an important symptom, and will not look for tenderness on percussion as a guiding symptom.

In cases pointing to temporo-sphenoidal abscess, I believe in an early diagnostic incision, making first for the roof of the petrous temporal and working forward, if our examination of the eye indicates pressure either on the 3rd or 6th nerves, or on the cavernous sinus; backwards if there is an absence of eye symptoms.

I have had no success in operations for septic thrombosis of the lateral sinus. An irregular temperature is the best diagnostic in these cases. The condition is a pyæmic one.

I have explored the cerebellum, but never yet had to deal either with abscess or tumour in that region.

Lastly, with regard to *intra-cranial hæmorrhage.* In non-

traumatic cases indicating intra-cranial hæmorrhage with coma, I believe the skull should be opened to relieve pressure, and give what may only be temporary relief. My experience in one case indicates that a patient at the point of death may be saved by operation.

In traumatic hæmorrhages, whether intra- or extra-dural, I am most anxious to impress on the Society the great belief which I have in most carefully watching for the first symptoms that arise after the patient has passed out of the state of concussion. During the period of consciousness—one, it may be, of minutes or of hours —the patient should be constantly watched. Just at the time when the general improvement is apt to make the attendants less watchful, at that very time they must be most careful to note the early symptoms, which are often the only true guide to the seat of the lesion. In several cases I have been led into serious error, neglecting in some to operate when I should have done so, and trephining in the wrong area in other cases, being misled by the condition of the patient when seen by me, no careful observations having been taken of the first onset of irritative symptoms in the period of consciousness between concussion and hæmorrhagic compression. I have not had a successful case of trephining for inflammatory compression. I am not a believer in depressed bone as a cause of persistent compression. Hence the stress I would lay on the purification of the wound in compound fracture being the primary essential. I do not trephine mainly to elevate depressed fragments, but in order to be able thoroughly to purify the injured area.

Now let me say a few words regarding a simple method of fixing the relation of the different lobes of the brain to the scalp surface.

In addition to the motor areas around the fissure of Rolando, we now, as operating surgeons, require to know the relations of the temporo-sphenoidal lobe in connexion with ear disease, the supra-marginal convolution in puncture of the lateral ventricle, the angular convolution in word-blindness, the occipital lobe in lesions of sight. The relations of the whole brain, except the anterior extremities of the frontal lobes, have become a necessity for the operating surgeon.

A simple, easily remembered, and trustworthy method of localization is all-important; one free from the necessity of remembering exact angles or exact measurements in inches will save a burden on the memory, altogether apart from the fact that angles must vary in different shaped skulls (the fissure of Rolando varies from 65° to 72° in its relation to the sagittal suture), and from the fact that the measurements in inches will vary with the size of the cranium and the age of the patient.

The head being shaved, find in the mesial line of the skull between the glabella (G) and the external occipital protuberance (O) the following points:—

First, The mid point (M); *second*, the three-quarter point (T); *third*, the seven-eighth point (S).

Find also the external angular process (E), and the root of the zygoma (P), immediately above and in front of the external auditory meatus.

Having found these five points, join EP, PS, and ET. Bisect EP and PS at N and R. Join MN and MR. Bisect also AB at C, and draw CD parallel to AM.

The pentagon ACBRPN corresponds to the temporo-sphenoidal lobe, with the exception of its apex, which is a little in front of N.

MDCA corresponds to the Rolandic area containing the fissure of Rolando, the ascending frontal and the ascending parietal convolutions. A is over the anterior branch of the middle meningeal artery and the bifurcation of the Sylvian fissure; AC follows its horizontal limb.

The lateral sinus at its highest point touches the line PS at R.

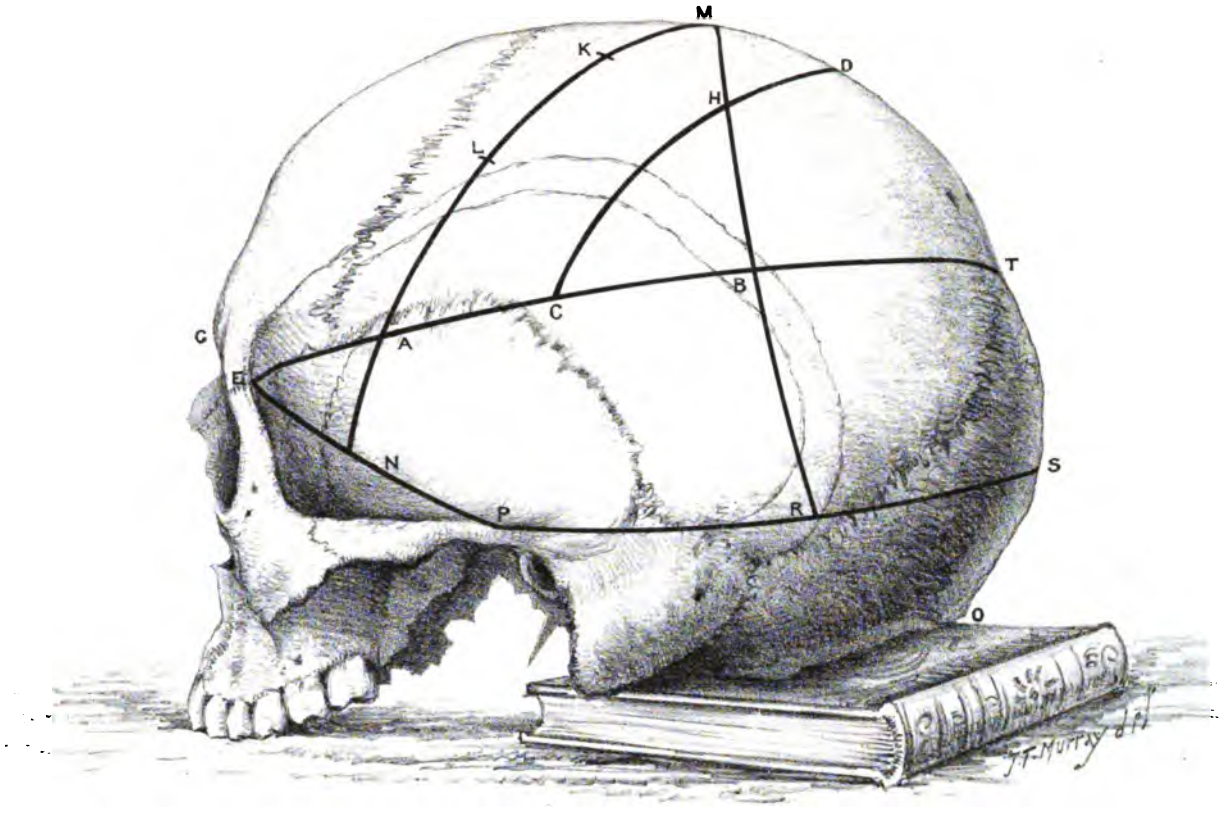
MA = the precentral sulcus, and if it be trisected at K and L, these points will correspond to the origins of the superior and inferior frontal sulci.

The supra-marginal convolution lies in the triangle HBC.

The angular gyrus is at B.

Mr Stiles demonstrated Kocher's method of Cerebral Localization.

Mr C. W. Cathcart said that for some time he had had the same view as Prof. Chiene, that it was very important that they should use natural marks on the skull, and not require to take measurements and draw angles. But Prof. Chiene's method, and that of Kocher described by Mr Stiles, would certainly, he thought, be very difficult to recollect. The method which he had worked out had only one measurement, and he believed it was sufficiently accurate, for he had verified the results upon Prof. Cunningham's models. The measurement that he took was that required to find the upper end of the fissure of Rolando, which, according to Prof. Thane, was half an inch behind the mid-point of a line extending from the glabellum to the external occipital protuberance. The other points he took were the external angular process of the frontal bone, and the zygomatic tubercle. A line drawn from half an inch behind the mid-point to the zygomatic tubercle gave the direction of the fissure of Rolando. A vertical line from the same tubercle struck the fissure of Sylvius at the point where its vertical branch began to show on the surface. The position of the fissure of Sylvius could always be ascertained on the dried skull by holding it up to the light, as there was a natural ridge of bone corresponding to it on the inner side. He had found that starting 1½ inches behind the external angular process of the frontal bone, the first part of the fissure of Sylvius ran upwards and backwards parallel to the lower border of the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zygoma as far as the mastoid process. Behind that its position was very variable. The parallel fissure could be marked out parallel to the fissure of Sylvius and an inch below it. The fissures of the frontal lobe ran at equal distances, a little in front of the fissure of Rolando. By this method, which was easily remembered, they could get sufficiently accurately the position of the main fissures, and other points in the surface of the brain could also be easily determined. The lower part of the temporo-sphenoidal lobe ran parallel to the zygomatic arch. That line, continued backwards, hit the upper part of the lateral sinus. The position of the middle meningeal artery before it spread out very nearly corresponded to the place where the vertical portion of the fissure of Sylvius began. Mr Cathcart then showed a number of preparations illustrating certain points in the surgical anatomy of the cranium, and also some pathological specimens.

Mr Caird referred to several cases and showed Preparations illustrative of Cerebral Surgery. He said that he regarded Thane's measurement as the most practical for cerebral topography. In regard to epilepsy, he believed that the most encouraging results were obtained in traumatic cases, and that before having recourse to the trephine where there was no evidence of a coarse lesion, the question of nerve-stretching should be discussed. Bearing on the results gained by electric stimulation of the cortical areas in epilepsy, he had met with two interesting cases. In one, on trephining and stimulating over the hand area of a boy who suffered from infantile hemiplegia with idiocy, he found that only a limited portion of the exposed cortex gave any reaction, and the reaction, curiously enough, was one in which apparently all the muscles supplied by the ulnar nerve, *and no others*, were thrown into spasm. The second case, where in like manner the hand area was stimulated, gave no response whatever, either to weak or strong currents, but that the correct area had been struck was shown by the subsequent paralysis of the hand and arm. The motor centre was removed in the first case, and in the second nothing was taken away. In each a temporary paralysis ensued.

Mr J. M. Cotterill thought that Prof. Chiene's dictum "that none but traumatic cases of epilepsy should be trephined" was too strong. If in so-called idiopathic cases there were distinct localizing symptoms (and especially in cases where there was paralysis of arm, leg, etc.), it was right to trephine, *in order to stop the fits*, when all other forms of treatment had been tried and had failed to give relief. Not only was it impossible to absolutely exclude traumatism in many so-called idiopathic cases, but it was by no means an impossibility that in idiopathic cases the hæmorrhage might be on the surface of the brain, and prove the starting-point of subsequent irritation. And, again, where paralysis already existed, the operation might all the more properly be done, as the

removal of an affected centre would not in such a case alter the usefulness of the arm or leg, and might be followed by a cessation of the fits. Whilst admitting the ingenuity of Prof. Chiene's and Prof. Kocher's methods of cerebral localization, Mr Cotterill strongly agreed with those who thought such rules rather elaborate for clinical use; and he hoped that Prof. Chiene could give the Society some more ready method, built up upon his more elaborate plan, which might be sufficiently accurate for use in the operating theatre. Having related a case in which he had tapped the lateral ventricle and withdrawn some 3 ounces of cerebro-spinal fluid, Mr Cotterill referred to the difficulty of continuous and slow drainage of the brain cavity, and suggested the possibility of drainage being carried on in some cases by a tube inserted into the anterior end of the lateral ventricle. Mr Cotterill then showed some instruments he had had devised for the purpose of throwing down a large flap of bone from the cranium, retaining its connexion with the skin and peri-cranium. The object of this was to enable a surgeon to lift a large flap of bone without destroying its vitality. The method consisted in making a large omega-shaped skin incision (much as recommended by Uhle, Horsley, Dawburn, and others), but it differed from their procedures in not only cutting through the line of bone exposed by this incision, but also sawing through the neck of bone, both from without inwards, by lifting the peri-cranium and skin and inserting a fine saw, and also by boring obliquely through the whole thickness of skull at each end of this neck of bone, passing in a fine chain saw, and dividing the bone from within outwards, after first passing a curved grooved director from one of these holes to another, in order to separate the dura mater from the bone and to hold it down out of the way of the saw. The section of the rest of the large circle or parallelogram of bone was performed by a circular saw fitted to an electro-motor or dental engine; and Mr Cotterill recommended that this section should be made, not at right angles to the surface of the cranium, but obliquely, at the expense of the inner table of the piece of bone lifted up, so that when it was put back in place it would not tend to fall below the level of the surrounding bone.

Mr A. G. Miller showed Preparation, and gave a synopsis of the following case:—

J. H., æt. 26, servant; admitted 28th February 1893.

Complaint.—Pain on right side of head.

History.—Ten years ago had discharge of pus from right ear; recurred one year ago. Discharge foul. Three weeks ago pain in head severe, and discharge copious; vomiting occasionally when pain most severe.

On admission patient was flushed, restless, thin, and worn-like, suffering from intense pain, but in full possession of senses. Right

side of head painful, but without any specially tender spot. Pulse 44; temperature subnormal.

March 2.—Mastoid antrum opened by Mr Miller. Bone much sclerosed; very little pus found.

After operation pulse rose from 44 to 66, and headache became less severe.

March 4.—Pain referred to occipital region mostly; became very drowsy in evening. Temperature, which had been subnormal, rose to 99°·6 F., and breathing became almost stertorous.

March 5.—Mr Hodsdon trephined first over temporo-sphenoidal area, and then over cerebellar area. In neither region was any abscess found, but a short time after some pus was supposed to have discharged itself from the former opening. The patient improved somewhat.

March 29.—Patient had twitchings of right arm and leg, which continued till April 4, when she had general convulsions, with opisthotonos.

After this patient gradually improved, and was sent out June 3rd, 1893, in good health, but with a sinus still discharging very slightly from the anterior trephine opening.

(*N.B.*—All the wounds were septic from the first, on account of their original connexion with the septic middle-ear disease.)

Dec. 3, 1893.—Patient had "a fit" at home, and was brought at once to the Infirmary. The sinus was opened up, and a drainage-tube inserted. Patient much relieved.

Jan. 19, 1894.—Temperature fell to 97° F.; on 24th, rose to 99°·8 F., accompanied by severe headache.

On 25th, Mr Miller passed a probe into the sinus inwards and backwards for about 2½ inches, when pus began to flow. There was subsequently a copious flow of clear fluid—cerebro-spinal probably. He then inserted a tube. Patient was much relieved for a day, when temperature rose to 103°·6 F., and she began to scream with pain. She had also loss of power in the left hand.

On consulting with Mr Duncan, it was decided that the neighbourhood of the sinus should be explored. Mr Miller accordingly removed a large circle of bone over the arm centre. On removal of the bone the dura bulged considerably. On cutting the dura the brain substance (after a considerable flow of cerebro-spinal fluid) rapidly protruded itself. Mr Miller inserted a probe-pointed bistoury in the sinus and slit up the brain substance, which was found to be very soft. No special abscess cavity was found, but the sinus was easily traced for about two inches, being lined with a pyogenic membrane. The wound was dressed with iodoform gauze. The patient was much relieved, but the left arm was completely paralyzed. On the day after the operation patient became drowsy, and gradually passed into a state of coma, and died on 30th January 1894.

Post-mortem.—Dura mater tense; large hernia cerebri on right side; no meningitis visible. On slicing the brain, pus was discovered in the right lateral ventricle, and was traced into the third and fourth ventricles. A connexion was made out between the posterior horn of the right lateral ventricle and the softened and suppurating brain substance in neighbourhood of operation wound. The right lateral sinus was obliterated and converted into a fibrous cord. Near the jugular foramen was an organized thrombus, about the size of a bean, in the sigmoid sinus, probably the result of thrombosis caused by former middle-ear disease.

Mr Miller said that he had contributed this case because he thought it interesting and important for two reasons:—(1) The case was an example of a temporo-sphenoidal abscess bursting into the lateral sinus; (2) of lateral sinus thrombosis, ending in obliteration of the sinus without suppuration.

Mr Hodsdon said he had three Specimens to show. Two were from cases of abscess, and the third from a case of sinus phlebitis. In the last, which occurred eighteen months ago, the sinus was opened and the internal jugular vein tied for the first time in Edinburgh. The patient was advanced in pyæmia, and died in consequence. The source of the mischief was found to be perforation in the roof of the tympanum. Mr Miller had at present in his wards a case of sinus phlebitis in which the same thing had been done on the second day. The patient suffered from chronic pyæmia for a time after the operation, but everything was now going on well. The question in these cases was the advisability of tying the internal jugular. He thought it added little to the danger of the operation of opening the sinus, though Macewen was against it, and said that it did not prevent the risk of pyæmia. The wound, however, was almost certain to become septic.

Dr George Mackay said that there was a good deal that might still be said as to the value of the eye symptoms in relation to cranial operations. He would like to emphasize Dr Bramwell's remark that there was the strongest evidence that the operation of trephining for intra-cranial tumours relieved the optic neuritis and other urgent symptoms, even though the tumour could not be removed. It was only syphilitic and tubercular lesions that drugs might cure, and even in these optic atrophy was very often the sad accompaniment of restored general health. The serious question came to be, How long should one wait before adopting operative procedure? Dr Victor Horsley had recently laid down the statement —and he wished that the surgeons present would bear in mind and test it—that one should not wait longer than six weeks in trying to relieve syphilitic conditions by drugs, and not longer than two months in tubercular conditions.

Mr David Wallace said Dr Mackay had alluded to one of the questions he had proposed to bring before them, namely, How soon should operative procedure be had recourse to in marked intra-cranial pressure probably due to a tumour, whether in the nature of a neoplasm, a syphiloma, or a mass of tubercular material? Dr Mackay had said it was a question for the surgeons to consider. He thought it was a question for the physicians to consider. He had seen many cases which had been treated for a long time before a surgeon was called in, and in which operation had been too long delayed. For how long might optic neuritis persist before atrophy occurred with consequent blindness, was a question difficult to answer, but of the highest importance. Delay in operation might mean, that although the cause of the neuritis was removed blindness was permanent. It had been recently contended that there were certain baneful ulterior effects from operative procedure upon the cranium and cranial contents. The argument was being advanced—and it was supported by some eminent physicians—that in certain cases surgeons produced by their procedure similar conditions to those for which they operated at other times. For example, it had been shown that the removal of a painful cicatrix might relieve epilepsy. Now, it was said that when a surgeon cut down to remove an epileptigenous centre he not only formed a scar in the scalp and in the dura, but he also made an actual cicatrix in the cortex. In the former cases, however, the epileptiform seizures were probably brought about by adhesions or by pressure upon the nerve terminations, and these were conditions which could be relieved by surgeons, and which were not left by them in their operative work if the wound was kept thoroughly aseptic. He had noted that in cases of general paralysis operated upon no adhesions took place between the cortex and the dura. This was a point of great importance. If the wound was kept aseptic only a linear cicatrix would be left in the scalp, the calvarium would remain smooth on its inner surface, and the scar in the dura, if the edges had been drawn accurately together, would be very small, and no adhesions were formed. He therefore did not think that in epilepsy operative procedure should be restricted merely to the cases in which there were the coarser lesions. He had on four different occasions removed portions of the cortex in Jacksonian epilepsy after stimulation by the Faradic current. He used ordinary electrodes, which he heated in a flame, and then dipped in sterile water. These were applied when the current was just strong enough to be felt on the tongue. One stimulation was sufficient to give rise to one movement. If the electrodes were applied for some length of time the movements tended to become clonic; and in one case, when kept on still longer, a distinct epileptic fit was produced. During stimulation he met with silent areas of various sizes. One was as large as a florin. He removed the portions of cortex simply with a knife and Kocher's forceps. There was afterwards paralysis and numbness in the

corresponding area of the limb. He believed that this was recovered from. One of his cases had been attended with remarkable success. The patient had been incapacitated from his work for two years, partly by epileptic fits and partly by periods of excitement. There was a distinct area of numbness and tingling in the little and ring fingers of the left hand. He was certified as insane and sent to an asylum. He was there operated upon, and the epileptigenous area was removed. A year and a half had now elapsed, and he reported himself in good general health, having had only one fit, which occurred during the night in July last. He was now regularly at work as a tram conductor, working sixteen hours daily.

Prof. Annandale, in reply, said that in winding up this important debate, he thought he was entitled to say that it had been a success, and he desired, in the name of the Society, to thank all those gentlemen who had so ably taken a part in it. The discussion had resulted in bringing many valuable pathological and clinical observations, experiences and opinions, and important suggestions in connexion with the topography of the brain before the Society, and all of these would, he felt sure, be useful as guides and encouragements in connexion with future intra-cranial surgery. It would detain the meeting much too long if he criticized all the various remarks which had been made, but he would endeavour briefly to refer to some of the more important points which had been brought out or emphasized in this discussion.

First.—He would refer to the cases of living patients shown to the meeting upon the second day of the discussion. The patients shown by Mr Cathcart, Dr M'Bride, Dr Johnston, Dr MacGillivray, Mr Milne, Dr Stewart of Leith, Dr Macpherson, Dr Gibson, Mr Caird, Dr James, and himself were all illustrations of the present practice in connexion with intra-cranial surgery, and, he thought, were also encouraging in connexion with the continued advancement of this branch of surgery. The very interesting observations of Dr James and Dr Milne Murray on temperature in connexion with the case of epilepsy shown would, he hoped, be continued as opportunities occurred.

Second.—The Pathological Specimens. Mr Cathcart showed an interesting specimen of temporo-sphenoidal abscess. Mr Caird's specimens illustrating cases of hæmorrhage from middle meningeal arteries, and also one illustrating suppuration the result of injury, were very interesting. Mr Miller's preparations were also of much interest. Dr Hodsdon's preparations, one of which was an example of ligature of the internal jugular vein in connexion with sinus thrombosis, were important additions to pathology.

Third.—The Clinical observations which had been submitted in this discussion were of great practical value. In this department he would refer to the clinical experience recorded by Prof. Grainger

Stewart, whose suggestions in connexion with intra-cranial surgery, founded upon pathological and clinical experience, were made many years ago, and he had, therefore, the credit that his views were in advance of the times. Dr Carmichael's observations in connexion with the earlier operative treatment of hydrocephalus were well worthy of consideration, and Dr Smart's well-known cerebellum case, so successfully diagnosed and so successfully treated by Prof. Chiene, was a proof of what might be done by operating in similar cases. Dr Bell's note of his surgical operation upon a case of microcephalus gave us encouragement to persevere in treating such cases surgically. Dr Ireland's courteous criticism upon this subject deserved attention, owing to his valuable experience of this condition. His contention as to the present unsatisfactory results obtained in the operative treatment of cases of imbecility was correct. At the same time he was still inclined to hold to his opinion that the success of such operations had been *fair* in so far that it might be considered a justifiable procedure in cases otherwise hopeless of relief. The Society would, he was sure, join with him in admiration of Dr Byrom Bramwell's contribution to the debate. The tabulation of his large experience in connexion with cerebral tumours was of great value; and although his statistics show that a very small percentage of brain tumours admit of successful removal, he was glad to note that he advised operative interference in cases unrelieved by other means, because such operations often gave temporary relief, and also relieved optic neuritis even if the tumour was not a removable one. Dr Bramwell's suggestion in regard to operative interference in tubercular meningitis, and in some cases of uræmia, was well worthy of the surgeon's consideration, as this and others of his suggestions for justifiable surgical proceedings were founded upon sound clinical and pathological experience. Dr Argyll Robertson, who unfortunately did not have an opportunity of speaking at the last meeting, asked him to confirm the fact that relief was afforded in optic neuritis by trephining. His explanation of the occurrence of optic neuritis in intra-cranial conditions was that the pressure, although it might affect other cranial nerves, most frequently affected the optic nerves, owing to the dense, inelastic sheath which surrounds these nerves, which are also traversed by dense septa passing through them. Dr Mackay had also expressed a similar opinion. Mr Duncan's philosophical and scientific remarks and the practical conclusions drawn from them must, he was sure, have impressed the Society. One value, in his opinion, of these remarks, is that surgeons will, as he (Prof. Annandale) suggested in his opening address, before practising intra-cranial operations, carefully consider the different cerebral elements and the different circumstances—physiological, psychological, clinical, and pathological—which might singly or together be present and producing symptoms. He was perfectly in accord with him in regard to the

importance of drainage when there was either a general or local increase of fluid causing intra-cranial pressure or other symptoms; and he admitted that surgeons had still to find some safe and efficient method of carrying out this principle. Prof. Chiene's clinical experiences in epilepsy, tumour, and abscess were valuable, as the result of practical experience. He was glad that he (Prof. Chiene) approved of early operation in suppuration the result of ear disease, and also approved of operation for intra-cranial pressure. His suggestions upon cerebral topography were also well worthy of consideration, as they were founded upon sound anatomical knowledge. Mr Stiles' demonstration upon Kocher's cerebral topography was most lucid and interesting. Mr Cathcart's remarks upon brain topography were also very interesting, as they were the result of careful observation, and the casts of the interior of the skull which he showed were likely to be most useful to the surgeon in connexion with operative procedure. Mr Cotterill, he was happy to think, confirmed his opinion that in aggravated cases of idiopathic epilepsy operative interference was admissible and justifiable. His suggestion in connexion with raising a flap of bone so as to expose some portion of the brain was ingenious, and well worthy of consideration by surgeons.

The contributions to special intra-cranial surgery have also been of much interest. Dr M'Bride in his remarks confirmed the general opinion that intra-cranial suppuration from ear disease was not always easily diagnosed, and he gave an interesting description of the operation for treating middle-ear and mastoid suppuration according to the method of Staphi; and he showed a patient upon whom he had successfully carried out the operative procedure. He (Prof. Annandale) thought there could be no doubt that this class of cases should be treated early when symptoms were present, and if suppuration was not met with in the mastoid antrum or cells, the skull should be at once opened, and, if necessary, at more than one point. Mr Berry's experience in regard to the rarity of optic neuritis in intra-cranial abscess was well worthy of note, as it might assist in distinguishing this condition from others,—such, for instance, as tumour, in which optic neuritis was common. Dr Tuke's remarks in connexion with the treatment of general paralysis by operation certainly encouraged the surgeon to operative procedure, but he admitted that such operating should be in the early stage of the disease, and should be accompanied with safe and continued drainage. If he understood Dr Tuke rightly, he made some objection to the use of the term intra-cranial pressure. He employed this term as a surgeon, and meant by it the conditions in which the cranial cavity was encroached upon by solids or fluids, so as to compress more or less of the brain substance, and produce symptoms. Such symptoms might be temporary or

continuous. In the former, Nature has relieved the condition by its powers of compensation or absorption. In the latter, Nature might be unable to so relieve, and it was for the surgeon to help her to do so by operation whenever it seemed possible. Their President was not so sanguine as to the good results of operative interference in this affection, as his views in regard to its pathology differed from those of Dr Tuke, but still he expressed the opinion that an operation might be justifiable if the symptoms were aggravated. A hint, the result of his large clinical experience, deserves careful attention, namely, that a temporary but marked improvement takes place in some of these cases in which no operation has been performed. Dr Clouston also expressed the opinion that in a certain number of insane people intra-cranial spiculæ of bone or other forms of bony growth developed, and that this was a cause of the mental trouble, and that if these could be removed the mental state might be relieved. Their President also expressed the opinion that even in some cases of acute insanity, operative interference might be useful as a counter-irritant, but he (Prof. Annandale) noted that he cautiously guarded this opinion by remarking that surgeons must first prove that the operation is without risk. He thought he could agree with him, in the name of surgery, that such operations have now the minimum of risk if performed with careful antiseptic precautions.

In conclusion, it had been a great pleasure to him that the discussion had tended to confirm the opinion expressed by him in his address, that intra-cranial surgery had a future, and that intra-cranial surgical procedures, as a means of diagnosis and treatment, would be more frequently resorted to, and would become more successful as their knowledge of the causation and progress of brain conditions increased. Careful records of the experiences and results of the various surgical operations performed for intra-cranial conditions would add much to such knowledge; and whether such operations were successful or not, it was to be urged that all of them should be honestly reported, so as to accumulate evidence for or against surgical interference.

The Chairman said that Prof. Annandale's remarks had been a most fitting termination to a most interesting discussion. He asked Prof. Chiene to answer Dr Cotterill's question as to his opinion about depressed fracture.

Prof. Chiene said he could not recall a case in which depression of bone had produced symptoms. He divided compression into three great divisions,—primary, reactionary, and inflammatory. Compression due to depressed fragments was to him an unknown quantity. When a patient came into the hospital with depressed bone and symptoms of compression, he would recover from the symptoms of compression if they waited long enough.

Mr Cathcart asked if depressed fragments might not be a cause of inflammation?

The Chairman said that while agreeing with Prof. Chiene that his pathology was correct in many of the cases, he must say that he had seen cases in which the depressed bone was the cause of the patient's symptoms, and in which the removal of it relieved them.

Dr D. W. Johnston has furnished the following Synopsis of Cases of Cranial Injury, which he was unfortunately prevented from reading to the Society during the discussion:—

I do not intend to attempt to tell you anything new about brain surgery, or to describe the technique of cranial operations. The following cases, however, which I wish to record, will serve to show the extent to which the brain may be injured and complete recovery take place. Most of the cases of fracture were compound, comminuted, and depressed, and in a suppurating septic condition when brought under my care. My experience of the smell of intra-cranial septic pus when it is evacuated is that it compares favourably with, if it does not beat, the worst smelling ischio-rectal or buccal abscess I have ever had to evacuate. Such, then, is the condition of most of the cases of fracture when received. In such cases I have removed all dead or doubtful bone, and stuffed the aperture right down on to the brain with an antiseptic dressing, such as iodoform gauze or boric lint. Where the pus has burrowed along the meninges a drainage-tube or hank of catgut has been inserted. In every such case perfectly free drainage is of the utmost value. In many instances large pieces of bone have been found driven into the brain substance, and removed without any perceptible after-evil result. My experience has been that the sooner a patient with a fractured skull is operated upon the better. It is a mistake to wait for symptoms of compression; and when symptoms of compression are already present, no time should be lost in operating, whether there be fracture or no. Of course I am referring to adult cases. On looking back on my cases I think it possible that had I operated at once on seeing case 6 he might have recovered, although there was no fracture in this case. In case 43, however, admitted to the hospital during my absence, my *locum tenens* thought it better to wait for symptoms of compression, etc. On my return I found the patient suffering from a passive inflammatory condition which, immediately after the operation, which was at once performed, became active and general, and the patient died a week after the operation. Where there was no septic condition, as in cases where there was no external wound, or in cases of epilepsy, I had the head shaved and washed the day before, and an antiseptic caput bandage applied all night. The

hands and instruments used were always rendered thoroughly aseptic, and where there was no necessity for drainage, the scalp wound was closed and a dry boric or iodoform dressing applied. I have never had one of these cases become septic. In my later cases, before replacing the scalp I have planted over the dura mater a few fine pieces of the disc I have removed. I shall not go over each case, but will give in more detail a few of the more important.

The first case I did not see after the operation, as I operated at a place forty miles distant from my residence. Flies were allowed to get into the wound, and the natives put the juice out of their pipes into the wound to kill the maggots. I have no doubt they were successful, but they also killed the patient.

Case No. 10 was a very severe case of traumatic epilepsy. He was an European, who had been struck on the head by a native with one of their large heavy sticks, known in the Colony as a knob-kerry. He got increasingly severe headaches, which gradually terminated in epilepsy. The fits gradually increased in severity and frequency, until when he came under my care, nine months after the injury, he had, as a rule, four or five fits during the day, and frequently as many during the night. He had always to have some one with him, and was weak and emaciated. I trephined over a cicatrix, the seat of the injury, which was situated over the temporo-sphenoidal area corresponding to the centre of the fissure of Rolando. During a fit there were contractions of the facial muscles and forearm of the opposite side. The trephine cut through the meninges at one side before I had got through the bone on the other, cutting a small vessel in its course. By tilting the trephine I succeeded in getting through the entire circumference of the disc without injuring the brain. There was an extraordinary flow of sanguineous fluid. As there was a considerable opening through the meninges admitting abundant drainage, and as the patient was in a very critical condition, I immediately stuffed the wound and covered it up without suturing the scalp. To add to the alarm in this case, the patient had an epileptic seizure shortly after the administration of the chloroform was begun. There was a trace of a fissure in the external plate, and there was a considerable thickening of the internal plate, which was more pronounced on one side of the disc removed. The patient made a good recovery, and had only one fit within three months after the operation, when he left for England.

Case 16.—This was a case of compound comminuted depressed fracture, on which I operated at a mission station in the country. The patient was doing well, but the heathen parents insisted on taking him home, where he was attended by a native medicine man. Three weeks after the operation he was brought to the

hospital. Above the ear, on the opposite side to that operated upon, I found a large fluctuating swelling, which I opened, evacuating a large quantity of fœtid pus. I found a roll of some vegetable substance, about the size of the end of the thumb, stuffed between the skull and brain where I had operated. To my horror I found the whole of both parietal bones quite dead and loose, and these I removed. I inserted a drainage-tube through the scalp above both ears. In this condition this man used to sit up and smoke with his brain literally floating in pus, and his head compressible like a concertina. He also conversed intelligently. He died five weeks after admittance to the hospital, from the pressure of pus on the medulla and spinal cord. This case serves to illustrate the value of free drainage.

Case 34.—C., an European who, the day before I saw him, had been out riding and had fallen from his horse on the side of his head. He was able to mount again and get home. When he got home he said he felt ill, and went to bed. He soon "went to sleep," but his friends did not think seriously of his condition, as he had been drinking. The following morning, however, when they found that he could not be roused, and that he was "breathing very funnily," they became alarmed and called me. I found the patient in a comatose condition, with stertorous breathing, and a weak, almost imperceptible pulse. There was a "gravel rash" on one side of the head, and the pupils enlarged, one a little more so than the other, and non-sensitive. I at once determined to trephine. It was nearly two hours from the time I saw him until I could operate. He was then in so serious a condition that I thought it hardly advisable to interfere. I trephined, however, at the lower part of the abrasion. The disc was speedily removed without any hitch, and with no other movement of the patient than an occasional twitching of the hand of the opposite side. Immediately the disc was removed there was a flow of dark sanguineous fluid, and bulging through the trephine hole there was a dark blood-clot. At the same time the patient began to kick a little and mutter, and I had to administer a little chloroform to finish the operation. I scooped as much of the clot away as I dared, put in a small drainage-tube, and put a stitch in the scalp. I thought it advisable and safer not to try to find a bleeding point, but to leave the clot over it undisturbed to become absorbed. The patient was restless the remainder of the day and during the night. The day following he was semi-conscious, and asked once for a drink. There was paralysis of the arm and leg of the opposite side, which rapidly disappeared, and the patient made an uninterrupted recovery.

Case 37.—MacP., an European, aged about 50, was struck on the head with a carpenter's hammer. The outer plate was seriously

comminuted. I counted seventeen fragments of this portion of the skull, which I removed. The inner plate was fractured into four almost equal parts, which, when placed together, corresponded exactly to the size of the head of the hammer used. There is no special surgical feature about this case, except that there was considerable laceration of the brain, one of the fragments of the inner plate having been driven deeply into its substance. The patient had completely recovered from the brain injury when he died, three months after the operation, from the spreading of an abdominal aneurism.

Case 38.—This patient had received no traumatism, but gave a history which pointed to meningitis, from which he had suffered about a year before. He became blind shortly after the illness, and came to me because of the violent headaches from which he was then suffering. Ophthalmoscopically both optic nerves appeared to be atrophied, but one a little less so than the other. I watched this man for about a week before operating, and he used to sit most of the day with his head in his hands, groaning. I trephined just anterior to the line of the fissure of Sylvius, in a line with the frontal eminence. On removing the disc the membranes bulged into the opening. I made a small incision through the membranes, and immediately there was a jet of clear serous fluid, which continued to rise for about an inch above the membrane until I enlarged the opening, when it continued to flow in a steady stream. Before I operated I thought I should tap the ventricles, but when I found so much sub-arachnoid fluid I thought this unnecessary. I inserted a hank of catgut for drainage purposes and closed up the wound. The patient made a good recovery, the headaches disappearing entirely, and, as the patient expressed his feelings, "life became worth living." There was, however, no more vision when the patient left the hospital, about two months after the operation, than when he came in.

Case 39.—This was a case of traumatic epilepsy. The following letter from the magistrate gives the history:—"'Nxomi' has been brought in by 'Pagati.' The former was struck on the head about three months ago, and he is still suffering from the effects. He cannot stand for long, but gets giddy and falls. Please examine him." I trephined over the seat of injury, and found evidence of a depressed fracture. The man made an uninterrupted recovery, and had no return of the fits.

Case 41.—This was an extensive fracture produced by a blow with the butt end of a rifle over the left frontal eminence, which at the autopsy was discovered to extend to the base. I made two trephine holes, and found great destruction of brain substance, with hæmorrhage into the same. The man was unconscious at the time of the operation, and never regained consciousness.

Case 42.—This case was somewhat similar to case 39, but, although he had had no more fits after the operation, he still complained of severe headaches up to a month after the operation, when I last saw him. I fear I did not drain this case sufficiently. There was a bulging over the seat of the trephine hole, indicating pressure from within. This I recommended to be re-opened and a drainage-tube inserted.

Case 43 I referred to at the beginning of this paper.

CRANIAL INJURIES.

No.	Name.	Nature of Injury.	Result.	Remarks.
1.	George.	Comp. com. dep. fracture of skull.	Died.	Died two weeks after operation from neglect. Did not see patient after operation.
2.	Rallangabuso.	Do. do.	Cured.	Operated after driving patient 35 miles in my own carriage.
3.	Gamelako.	Do. do.	Do.	
4.	Hollosh.	Do. do.	Do.	
5.	Nosibutulu.	Extensive fracture of skull.	Died.	Child. Fracture from hoe. Died from cerebral hernia.
6.	Nquisliso.	Intra-cranial hæmorrhage.	Do.	Brought into hospital in comatose condition in the evening, and died next morning. P.-M., rupture of middle meningeal artery. Did not operate.
7.	Xalabele.	Fract. skull.	Cured.	
8.	Tom.	Do. do. —base.	Do.	Did not operate.
9.	Uzololu.	Fract. skull.	Do.	
10.	H. (European).	Traumatic epilepsy.	Do.	
11.	Gobo.	Fract. skull.	Do.	
12.	Uvilapi.	Do. do.	Do.	
13.	Xwatshuka.	Do. do.	Do.	
14.	Sarah.	Do. do.	Do.	
15.	Dolori.	Do. do.	Do.	
16.	Ndewn.	Do. do.	Died.	Operated in country. Died eight weeks after in hospital.
17.	Sijidi.	Do. do.	Cured.	
18.	Dida.	Do. do.	Do.	
19.	Wabola.	Do. do.	Do.	
20.	Fanapi.	Do. do.	Do.	
21.	Stoffel.	Do. do.	Do.	
22.	Tongelo.	Do. do.	Do.	
23.	Butani.	Do. do.	Do.	
24.	Mamhalangu.	Do. do.	Do.	

No.	Name.	Nature of Injury.	Result.	Remarks.
25.	Mankau.	Fract. Skull.	Cured.	
26.	Geti.	Do. do.	Do.	
27.	Mtisani.	Do. do.	Do.	
28.	Tiliswe.	Do. do.	Do.	
29.	Tyuliso.	Do. do.	Do.	
30.	Ishamasi.	Do. do.	Do.	
31.	Kaliba.	Do. do. —base.	Died.	Did not operate.
32.	Mfutshani.	Fract. skull.	Cured.	
33.	Tom.	Do. do.	Do.	
34.	C. (European).	Intra-cranial hæmorrhage.	Do.	Trephined over seat of meningeal artery. Tied no vessel.
35.	Kambi.	Fract. skull.	Do.	
36.	Qwili.	Do. do.	Do.	
37.	Mac. (European).	Do. do.	Do.	Died three months after from spreading abdominal aneurism.
38.	Gati.	Amaurosis.	Improved.	Trephined.
39.	Nxomi.	Epilepsy, traumatic.	Cured.	See magistrate's letter.
40.	Mary.	Fract. skull.	Do.	Child injured by hoe.
41.	Majuba.	Fract. skull, extending to base.	Died.	Trephined in two places. Extensive destruction of brain substance.
42.	Charley.	Traumatic epilepsy.	Improved.	Still suffering from severe headaches a month after operation, but had had no fits.
43.	Mali.	Fractured skull.	Died.	Patient admitted during my absence. Operated on return. General inflammation immediately followed, and death took place a week afterwards.

Meeting VII.—March 7, 1894.

Dr R. J. Blair Cunynghame, *Vice-President, in the Chair.*

I. Exhibition of Patients.

1. *Mr Cotterill* showed—(*a*) A patient after EXCISION OF TONGUE; (*b*) a patient on whom EXCISION OF THE LARYNX had been performed; (*c*) a patient operated on for INTUSSUSCEPTION OF COLON.

2. *Dr Byrom Bramwell* showed a case of LUPUS and a case

of ICHTHYOSIS under THYROID TREATMENT, whom he had exhibited at a previous meeting.

II. DEMONSTRATION.

Dr Clouston, *Dr Middlemass*, and *Dr W. F. Robertson* gave a Demonstration of the MICROSCOPIC PATHOLOGICAL CHANGES FOUND IN THE BRAIN AND ITS MEMBRANES IN INSANITY, which was illustrated by a series of Diagrams, 55 Sections and Micro-photographs.

The Chairman, in inviting a discussion, remarked that the demonstration had been both a valuable and interesting one. For his own part, he had seen for the first time some things he had only read about, and he now understood them much better, and he had also learned many things which he had not known before.

Dr Batty Tuke said that no one had a better right than he to congratulate Dr Clouston and his colleagues upon the success of their demonstration. He did so, however, almost with a feeling of pain. This feeling was caused by a recollection of how long ago it was since he began to work upon the same subject. He could remember when there was only one man in England and one in Scotland who knew how to make a section, and he had still a vivid recollection of the intense satisfaction he experienced when he first saw a nerve cell in a section cut with his own hand. But whatever feeling of pain he had on this account was compensated for by the realization of the hope he had had thirty years ago when beginning this kind of work. He had never seen finer preparations than those shown by Dr Clouston. Some of them were intensely interesting. They might feel now that the first volume of the atlas of the brain anatomy was closed. They knew now pretty well about the changes in nerve cells. But there was another atlas to make, and one which was the most important of all. If they held that the function of mind was a function of connexions, their next inquiry must be as to how these connexions were destroyed. Of all the specimens that had been shown that night the most insignificant was probably the most important. It was that of colloid degeneration. When he first saw this condition many years ago, he had laid it down to a change in the connective tissue. Bevan Lewis, however, had convinced him that it was due to collections of myeline. The myeline sheath being the protector of the axis cylinder, if it was destroyed the conductivity of the fibres was destroyed also. He observed that Dr Clouston had failed to demonstrate the large cells which Cajal had figured in the external layer of the grey matter. He himself had also failed to see them. In conclusion, he moved an earnest vote of thanks to Dr Clouston for his demonstration.

Dr W. Allan Jamieson asked Dr Clouston if the nucleus of the nerve cell was preserved in puerperal insanity, in which he had

said there was frequently complete recovery although there was known to be marked degeneration of the cells? If so, it would exactly correspond to what was known to occur in the case of fat cells when plumpness was restored after a period of emaciation.

Dr Clouston replied that he believed it was so.

Dr Byrom Bramwell said he had great pleasure in seconding the vote of thanks which Dr Tuke had proposed. He had listened with admiration to Dr Clouston's most interesting demonstration. The preparations, drawings, and slides were of great interest and beauty. He was sure that the Society would agree with him in thinking that they were greatly indebted both to Dr Clouston and to his assistants. The amount of labour which the preparation of the drawings and the arrangement of the demonstration had entailed must have been very great. Many of the changes which Dr Clouston had demonstrated were not confined to insanity. He was perfectly familiar with most of the appearances which had been described. He had seen almost all of them in preparations made from brains of persons who were not insane. Some of the pathological appearances were no doubt due to senile changes; others to vascular alterations which occurred in the sane as well as the insane. The great advance in our knowledge of the microscopical appearances (both normal and pathological) of the brain and other parts of the nervous system which had taken place during the past few years was, he thought, largely the result of improved methods. No doubt, in the near future further improvements would result, and our knowledge would be still further extended. Some of the modern methods could hardly, however, be improved upon. The preparations which were exhibited showing the spider cells and their ramifying processes were simply perfect. It was a pity that the half-clearing method, which gave such very beautiful results, and which demonstrated so perfectly the details of the nerve cells and of their processes, and of the minute nerve fibrils, was not permanent.

Dr Leith said that they had received in an extremely complete manner a picture of the intra-cranial changes in insanity that none of them probably had had an opportunity of observing before. He would like to emphasize what had been said as to the great importance of the two sections—the one of the brain of the fully grown fœtus, and the other from a case of congenital idiocy. They were in themselves a striking object lesson, the value of which would be enormous if the condition were a general one in such cases. He understood, however, that it was only in a very small proportion of cases of congenital idiocy that it occurred. The granulations which were seen so frequently in the ependyma were to be regarded as papillomatous and not epitheliomatous. He wished to know if Dr Clouston meant them to understand that the processes of the spider cells passed through the adventitia and media of the arteries to the intima?

Dr Gulland said that he had only the highest praise for the demonstration which Dr Clouston and his assistants had given them. He took exception, however, to Dr Clouston's theory of the function of the spider cells. As he understood that theory, it was that the vascular process of the neuroglia cell was attached to the nucleus or the cell of a capillary or arteriole, which transformed the blood plasma and passed it on through the processes of the spider cell into the nervous matter for the nutrition of the nerve cells. There were several objections of very considerable weight to such a theory. The Deiter's cells were of infrequent occurrence in the grey matter, except in the extreme superficial layer. By far the largest numbers were in the white matter. That went far to show that the old view that they were simply connective tissue cells was the correct one. He had often seen in specimens prepared by Golgi's method half a dozen processes going to a vessel. He regarded them simply as guy ropes. He could not see how Dr Clouston's theory explained the enlargement of the Deiter's cells in diseased conditions of the brain. One would rather expect them to be diminished in such cases. He could not agree, either, with Bevan Lewis's theory that they were scavenger cells. The light in which he himself was inclined to regard subpial felting was that of a simple cirrhosis comparable to cirrhosis in any other organ. The fact that it was so prominent in chronic alcoholism seemed to him to be conclusive that it was a connective tissue, and not a nutritive tissue. All the recent work done by Golgi's method went to show that the protoplasmic processes of the pyramidal cells lay close to the vessels, and through the cell nourished the axis cylinder. He noticed in some of the preparations degenerated cells which he would be very much inclined to place in the category of cells invaded by leucocytes, which Dr Tuke had described some time ago. He would like to hear from Dr Clouston if that occurred to any extent.

Dr Middlemass said that with regard to Dr Gulland's remarks he had himself felt that Dr Clouston's theory of the function of the neuroglia cells would require more study before one could say it was right or wrong. He was not inclined to favour the idea, though it was not one that should be given up without further examination. Probably some part of it might be correct. The normal Deiter's cells existed chiefly under the pia mater and in the white matter. That was one of his difficulties in accepting Dr Clouston's idea. Another point was that if they were nutritive in function they would be prominent in health and not so marked in disease. But in diseased conditions they multiplied. There were other reasons also for his diffidence in accepting Dr Clouston's theory. Regarding Dr Gulland's question about phagocytosis in the brain, his experience was against it, as he had had no satisfactory evidence of its occurrence.

Dr Clouston, in replying, said he wished to express his extreme

gratitude for the kindly way in which they had received the demonstration, and to emphasize the fact that to his colleagues Drs Middlemass and Robertson belonged all the credit of it. He had done the talking; they had done the work. He could not but feel that the objections urged against his theory by Dr Gulland and Dr Middlemass were very strong. There were various reasons that had made him dissatisfied with Dr Bevan Lewis's view. What seemed to him to point in the direction of the theory he had expressed as a hypothesis merely was, in the first place, that the vascular processes were attached in large numbers, not merely as guy ropes to the larger vessels, but also to the nuclei of the capillaries, which bulged out in funnel-shaped projections to join them. In this it seemed to him they had an arrangement that pointed to a nutritive rather than a supporting function. In the second place, it appeared, on examining these vascular processes, that they were tubular. He had always been of opinion that the numerous nuclei of the capillary walls had some other function than that merely of nourishing a certain area of the capillary wall around each nucleus. He had a theory that, for example, the nuclei of the capillaries of the liver had a somewhat different function from those of the brain,—that, in fact, the nuclei of the capillaries of any one tissue were different from those of another, and had a sort of organity unity with that tissue. Then taking an area of manifest irritation around a softening, it seemed to him that there was an excessive action in the tissues, and that that excessive action was followed by an enormous multiplication of these spider cells and of the nuclei of the vessels, which pointed to a common trophic function. There appeared no necessity for the multiplication of such mere binding tissue. But if the whole nutritive process of the part was profoundly disturbed, all the nutritive elements of the tissue would be hypertrophied. It seemed to him that in the capillaries, the burr-like Deiter's cells and the fibrillar structure which, passing in all directions from the cells, pervades the whole cortex, they had one structure all hanging together and with one function. The nuclei removed from the blood current the crude material from which grey matter was formed, passing it on through the vascular processes of the spider cells, where it underwent a further process of metabolism, and was passed on and kept moving by the capillary attraction of the fibrils till it reached the nerve cells. It seemed natural that in nervous disturbances the nutritive apparatus should become greatly altered. With regard to Dr Leith's question, he thought that the vascular processes were attached to the adventitia in the case of the arteries. As to the question of phagocytosis, perhaps owing to the mode of preparation employed he had not found facts pointing to leucocyte action upon the brain cells. It was very difficult to say why brain cells should degenerate and disappear. There were certain diseases, such as general paralysis,

which one looked upon as a death of the nerve tissue. He was quite certain that this did not take place through the bloodvessels. These were necessarily not the masters but the servants of the brain tissue. All the changes in general paralysis, he believed, must originate in the actual neurine tissue.

Meeting VIII.—May 2, 1894.

Dr CLOUSTON, *President, in the Chair.*

I. ELECTION OF MEMBERS.

Prof. Fr. von Esmarch, M.D., Keil, was elected an Honorary Member of the Society.

The following gentlemen were elected Ordinary Members of the Society:—Robert Muir, M.D., 20 Hartington Place, Edinburgh; John Cumming, L.R.C.P. & S. Ed., 94 Gilmore Place, Edinburgh.

II. EXHIBITION OF PATIENTS.

1. *Mr Caird* showed two patients after recovery from TRACHEOTOMY FOR DIPHTHERIA.

2. *Dr Graham* showed a case of FRACTURE OF THE SUPERIOR MAXILLA.

III. EXHIBITION OF SPECIMENS.

1. *Mr Caird* showed specimens illustrating TRACHEOTOMY AND DIPHTHERIA.

2. *Dr Graham* showed a JOINT which had been excised by Sir Joseph Lister in 1884.

IV. ORIGINAL COMMUNICATIONS.

1. THE COMMONER VARIETIES OF LUPUS VULGARIS AND THEIR TREATMENT.

By NORMAN WALKER, M.D., F.R.C.P. Ed., Assistant Physician for Dermatology, Edinburgh Royal Infirmary.

IT is not my intention to discuss the histology of lupus, or to review once more the arguments in favour of its tubercular nature. To any one who may still have doubts on that subject, I would recommend the perusal of Prof. Leloir's admirable monograph on "Tuberculosis of the Skin and Mucous Membranes." Lupus has already been several times before the Society this session, usually to indicate the advantages of one or other form of treatment; but

I venture to think that the side from which I approach it is a useful as well as a somewhat novel one, while it will at the same time afford free scope to the members of the Society to enunciate their views on a most important subject.

That there are varieties of lupus has been recognised almost as long as the disease itself. Originally divided into *lupus exedens* and *lupus non exedens*, the latter of these terms, which included *lupus erythematosus*, has almost passed out of use, and we have in its room a multiplicity of terms—lupus disseminatus, hypertrophicus, verrucosus, papillomatosus, lupus vulgaire erythematoïde, and a host of others more or less scientific. While not questioning the applicability of many of these names, it seems to me that the enormous majority of the commonly occurring cases may be more simply grouped, and it is only with these commonly occurring cases and their treatment that I propose to deal.

Lupus is a disease which seems to be common property. It may be found in any ward in the Royal Infirmary with the single exception of the Lock, and many of the cases on which I have made observations were not under treatment in the skin department. It appears to be common in Scotland. I speak, of course, relatively, and my experience accords with the observation that it is more common in the female sex.

As to the age at which it occurs, modern scepticism is steadily breaking down the old view that lupus is a disease exclusively of the young. I have seen quite a number of cases in middle-aged and even elderly people, and I am convinced that mistakes in diagnosis sometimes are due to the still widespread belief in the old dogma.

The varieties which form by far the greater proportion of the cases which have come under my notice are three in number, and are, in their order of frequency—

1. The "ulcerating" form. For this form the name of lupus exedens is probably the best.

2. For the second I would suggest the simple name of lupus vulgaris. In this form the most prominent feature is the presence of the apple-jelly nodules of Hutchinson. These may be singly disposed or may run together into considerable areas. There is no "ulceration."

3. The third may, I think, fairly be described as L. fibrosus, or fibroid tubercle of the skin.

The first of these is common, and probably most typical of the general conception of lupus. The affected area, most commonly on the face, is covered with granulations from which issues a purulent discharge which dries up into a dirty scab.

Now, we are accustomed to consider these cases as *ulcerative*, and the granulations as identical, or nearly so, with those of a simple ulcer; but, so far as my observation goes, they present important differences. In every case which I have examined these "granulations" are covered by epidermis,—a swollen dropsi-

cal epidermis, which may only consist of one or two layers of cells, but is still detectable.

In one case where the ulcerative appearances were so marked that I removed the ulcer under the belief that it was a rodent, this condition was present. This observation confirms one already made to this Society by Dr M'Bride, some of whose sections I have examined, regarding lupus of the mucous membranes where this same condition is present.

A further interesting confirmation I have got from Prof. Leloir's monograph. Although he does not verbally refer to it, every one of his drawings of lupus shows epithelium present. Sometimes the granulations are so dropsical that they present the appearance of a myxoma; they may be so infiltrated with round cells as to suggest a round-celled sarcoma, but they are always covered with epithelial cells.

These epithelial cells are, of course, far from normal,—they are swollen, their nucleus often degenerating; they are loosely adherent, and they allow freely the passage of serum and leucocytes. So marked is this catarrhal process that the tubercular nature of the malady is sometimes almost obscured, but one can usually find at the lower border of the infiltration tubercle follicles with giant and epithelioid cells. The process is mainly a catarrhal one, and the question arises—To what is this due? It is, I believe, in no direct way related to the tubercular process, but is due to the action of other (pyogenic) organisms. This is, of course, no new doctrine, but to it and another observation of Unna's, made in another connexion, I would subscribe. The other observation is that these organisms do not penetrate into the deeper parts, but cause the catarrhal process by a chemiotactic action. Just below the surface may be found, surrounded by masses of leucocytes, large collections of chain and cluster cocci. I am, of course, very familiar with the fact that on the surface of the skin large numbers of organisms are found. These, however, do not belong to that category.

The second form is also very common, and may occur in any situation, though most common on the face. In it the tubercular process is practically unaccompanied by any secondary changes, and it may fairly enough be described as miliary tubercle of the skin, or, as I suggested earlier, as *lupus vulgaris* without any qualifying adjective.

It presents on examination enormous numbers of tiny tubercle follicles which, when they enlarge, show as the apple-jelly nodules, or may, by coalescence, form large areas of irregular shape. The skin is evidently unbroken and relatively little affected. The papillæ over superficial nodules are gone, but the layers of the rete still remain. If, however, a number of superficially-lying nodules coalesce, the nutrition of the epidermis is interfered with, pyogenic organisms find a habitat, and the case passes into the catarrhal form. In many cases, however, this does not occur, and the disease

extends by the formation of new nodules until large areas are involved.

Many of the older nodules disappear, leaving in their place a scar, but it is a scar which is practically never a healthy one, and thus the area is always enlarging, the margin being the seat of the most active disease. The nodules vary in the depth at which they are situated. It does not seem reasonable to suppose that they have the power of locomotion, and thus becoming more superficial; but, of course, an increase of size would bring a part of the nodule near the surface. But sometimes the nodules are extremely superficial, and then the prognosis is all the more favourable.

As to the structure of the follicles, it is that of tubercle, consisting of giant and epithelioid cells. The only point in which I feel compelled to differ from some recent observers is as regards caseation. There is in the follicles a certain blurring of the outlines of the cells, which is no doubt of that nature, but I can find nothing at all comparable to the caseation occurring in other organs, such as the spleen. But this is hardly a practical point.

I enter on the consideration of the third class with some trepidation, for though the cases are not uncommon, my observations on them do not accord with those of the text-books. Neither Mr Morris nor Dr Crocker, the author of the most recently published works on dermatology, refer directly to them, and yet, to my thinking, they present both clinically and anatomically very marked characteristics. The cases to which I refer occur usually on the limbs, rarely on the face, and present the following characters:—The patch, usually single, varies in size from a sixpence up to six inches in diameter. It is red and often scaly, the skin is thickened and often thrown into folds, and when pinched up is felt to be very firm and stiff to the touch. Any appearance of lupus nodules is masked by the diffuse redness present, but the reddish pink colour of the centre is mingled at the margin with an orange hue. This, however, is not very evident, and such cases are quite often diagnosed as patches of chronic eczema or psoriasis. The buttock is not infrequently attacked. In three of my cases it has been the seat of the disease, and in Leloir's monograph there is a fair plate of the condition.

None of my cases have shown any tendency to ulceration. They have slowly spread, but never, except under treatment, has there been the faintest tendency to break down. Now and then a small abscess, which I have traced to a softened tubercle, forms, but it rapidly heals.

It seemed to me that these cases presented good hope of cure by excision, and I have therefore had a pretty full opportunity of studying the anatomy of this form. The essential part of the process is, of course, the formation of tubercle, but these are comparatively few in number; and they are imbedded in a densely thickened corium, a thickening due to the increased formation of

fibrous tissue. Here and there the softening of a tubercle is observed much more often histologically than clinically, and they would appear, many of them, to be absorbed. This must also be the direct fate of many of the tubercle follicles, for they are very much more abundant at the margin than at the centre of the patch, while the condition of the fibrous tissue is reversed.

The papillæ of the skin appear to be increased on account of an increase in the interpapillary processes of the rete, but there is no true increase of the papillæ. That belongs to another and fortunately rarer form of this disease. Sometimes the horny layer is excessively thick, a condition which may be noted clinically. But the essential characteristic of this form is the great increase in the fibrous tissue of the corium, an increase which must be due to the stimulation of the tubercular poison, and which I think warrants the application of the term L. fibrosus.

As to treatment, our aim, of course, is in all cases the destruction of the tubercle bacillus either by direct or indirect means, but the same methods are not equally adapted for all cases, and in our warfare against the disease we must not forget, as Mr Morris sagely remarks, that there is a patient behind it.

As to any internal treatment, I use only one remedy, viz., cod-liver oil, and it can only assist other measures,—it will never cure the disease. Many drugs may be indicated by the condition of the patient, and my remarks on their general uselessness only apply to those cases where the patient, except for his lupus, is in good health. Of the thyroid treatment recently recommended by Dr Bramwell, I have so little experience that I prefer not to pass any opinion. But that the case on which he first tried it, and which I saw once before sending to him for admission, was enormously improved I am most ready to admit.

Local treatment is absolutely essential, but the principles which should guide this local treatment are to my mind not sufficiently defined; and I think it is possible to lay down some general rules which may guide us in the treatment of particular cases.

Of course, excision where possible would, if satisfactory, be the best treatment. But my experience has not been altogether happy. Some of the cases have relapsed, though some have apparently been cured. In a case which I have here to-night, Mr Miller kindly excised a patch rather larger than a crown. Although the wound did not look at all nice at the time, the result is remarkably good. I would not go so far as to say that there is no tubercle present, but I can observe no evidence of it.

Of one thing, however, my experience of excision has made me very sure, and that is that excision must be very wide. In examining the removed portion I have always found small tubercles perilously near the track of the knife, although the incision was to all appearance quite clear of the disease.

In using other forms of local treatment our aim is the removal

or destruction of the tubercle bacillus, and as we cannot see it we must be guided by the evidence of its presence—the tubercular nodules. Now, it is to me, at least, evident that simple scraping, *the* favourite remedy, as I suppose I may call it, is not equally applicable to all cases. It removes all the soft cellular tissues which lie on the surface, but as soon as the spoon reaches formed connective tissue, nothing but undue force will enable it to remove any more. Yet tubercles lie in this tissue, which as time goes on grow and multiply, and the case, temporarily improved, is in time as bad as ever again.

I hope I have made it clear, in speaking of the varieties, that these are due to secondary changes exclusively, the tubercular element being the same in all. I endeavour to make treatment follow these lines, and first aim at removing those secondary changes, thus bringing the skin into a condition as nearly normal as it is possible for an organ affected with tubercle to be, and then I attack those tubercles.

In the ulcerative form we have a large amount of a loose œdematous cellular tissue, a condition brought about by secondary infection. This condition may be removed by prolonged antiseptic dressing, as by Brooke's ointment, but is much more rapidly and efficaciously done by the spoon. After the part has been thoroughly scraped, some further benefit may be attained by the application of nitrate of silver, sublimate, pyrogallic or carbolic acid. By this means all the secondary products and a considerable amount of tubercular tissue is removed.

In the nodular or apple-jelly form of the disease no secondary process is present, but the nodules are present in such numbers that it would be an almost hopeless task to endeavour to destroy them individually, and their number may be reduced by the application of one or other of the selective drugs which destroy the weakened tubercular tissue, and have comparatively little effect on the healthy skin.

The treatment of the fibroid form of the disease by scraping demands an amount of resolution and an expenditure of energy which is but poorly rewarded by the result. Here, too, I try to get rid of the secondary change, the formation of fibrous tissue, before directly attacking the disease. The method I have found most useful in that respect is blistering, and I believe that the reputation of many of the applications in lupus is dependent to a large degree on their counter-irritating properties. The effect of repeated blisters is to remove much of the thickening and bring the nodules to sight. The action is no doubt somewhat similar to the congestion method of Bier, for blistering causes severe local congestion, and I gather from Mr Miller that it is in these fibroid cases that most benefit results from Bier's method.

Finally, having reduced the nodules in number and brought them to view, I proceed to destroy them, and without detaining

the Society by a discussion of the different methods, I will simply say that I find the cautery the most satisfactory weapon. I use either a fine Pacquelin or the galvanic cautery, and I am inclined to give the preference to the latter. It does not seem to destroy much, but a few days after quite a considerable slough separates, and recurrences are, I think, less frequent after its use. Recently, when only one or two nodules have remained, I have used electrolysis, but it is not applicable to large areas.

The great remedy for lupus is perseverance. Whatever be the original form of the disease it must be followed through until the last tiny nodule has disappeared, and this demands much patience on both sides. I never now undertake the treatment of a case without explaining to the patient or the friends that a prolonged course of treatment will probably, or rather certainly, be necessary. No single operation except the most heroic excision can possibly cure the disease.

I have only been able to indicate a few general views on the subject, and have had to leave much untouched. The selection of a particular selective drug is one of much import, for all cases do not do equally well on the same. I hope, however, that I have made clear the anatomical difference between those common clinical varieties, and that these differences may be found useful as indicating the lines along which treatment should proceed.

Note.—Thyroid Treatment. Since writing this paper I have had further opportunities of observing the effects of this remedy, and as it is at present the object of so much attention, it is perhaps as well that I should state the results of these observations. Considerable improvement is usually produced, but this improvement is in the disappearance of those secondary changes to which I have referred. The effect of the thyroid is to reduce the catarrhal to the simple form, but I question very much if the tubercular process is appreciably affected, and the surgical methods are so very much more expeditious that they will usually be preferred. But in some cases I believe it may prove of use, and it certainly deserves further investigation.

Mr A. G. Miller said he would like to say a few words upon three methods of treating lupus. They were,—(1), Bier's congestion method; (2), scraping; and (3), excision. It was important to bear in mind that in lupus, as in all tubercular affections, the results of treatment depended very much upon the peculiarity of the patient's constitution, or whatever else they chose to call it. There were some tubercular patients who would not kill. They seemed to have a tendency to work through all sorts of tubercular conditions, and to get well. Others, let them do the best they could for them, went down the hill. He had now tried Bier's congestion method in several cases, and had reason to be very well satisfied with it so far. In the case of the girl with tubercular affection of both feet whom he had already shown to the Society, he had treated one foot by Bier's method, and the other by blistering and scraping.

The main difference between the two limbs ultimately was that the spreading foci, which were very numerous, had disappeared in the Bier's foot, and had not returned. The congestion seemed specially to prevent the tendency to spread. Bier's method, with the addition of scraping, he thought, was an excellent way of treating lupus. With regard to treatment by scraping, it was of no use unless it was done thoroughly. There were three different areas in lupus,—the cicatricial, which had got well, and did not need to be meddled with; the granulation, which might be scraped if they liked; and the area of apple-jelly nodules. For the last, which was the spreading area, scraping, with a Volkmann's spoon at least, was of no value whatever. If they were to destroy lupus by scraping, they must employ the very smallest sharp spoon they could get. He much preferred the older spoon of Squire. It just fitted a lupus nodule. It was, in addition, a splendid diagnostic aid. It would only go in if there was a nodule. He had had a case from which he scraped away a considerable amount of granulation tissue. No tubercle bacilli were found in it. But in one of the nodules removed by means of a Squire's spoon myriads were found. He adopted Sir Joseph Lister's plan of applying pure carbolic acid after scraping away everything. It probably helped to destroy the bacilli, but in addition it produced a white pellicle, which he removed, and so made an extra scraping. Regarding excision, he entirely agreed with what Dr Walker had said. It must be very free if it was to be successful.

Mr Miller then showed a LAD who had suffered for many years from lupus, which extended over nearly the whole of the face and neck, and into the mouth and nostrils. It had been scraped forty-eight times with the patient under chloroform. Only two or three of these scrapings, however, had been extensive. Great improvement had been effected, and the patient was now nearly well.

Dr W. Allan Jamieson said that the observation which Dr Walker had made with regard to the presence of epithelium over the granulations was an exceedingly interesting one. They had generally been led to believe that there was an entire loss of epithelium, and that the ulcer had eaten a way into the corium itself, the nodules commencing in the corium, and from the presence of pathogenic organisms leading to secondary changes producing ulceration. Regarding the fibroid form, there was no doubt that they met with lupus on the limbs of a more dense and persistent form than on the face. This, however, might be due to the fact that in the limbs there was a thicker layer of epidermis and a less superficial vascularity. Fibroid lupus was therefore probably simply a variation from the ordinary type without being actually another variety of the disease. There was a variety of lupus known as *lupus verrucosus*, of which the ordinary post-mortem wart was an example. This form at first sight seemed to

be quite different from ordinary lupus; but when, by means of salicylic plasters or scraping, the papillary hypertrophy was removed, they came down upon a tissue in which there was a fibrous state of the skin and apple-jelly nodules,—in fact, it was reduced to a lupus vulgaris *plus* more connective tissue. This form was rare on the face. When it was found there, it occurred on the upper lip or chin, where the skin approximated more to that of the extremities than on the cheek or nose. Therefore he thought that while Dr Walker was inclined to cast aside the too numerous and superfluous nomenclature of lupus, he had erred a little in the same way by adding another form which simply depended upon a difference of situation, or upon an excess of what was normal in all conditions of lupus,—the presence of *lupus fibroma*, as Unna had called it. Excision was hardly applicable for the face, as it seldom left a linear cicatrix. If skin-grafting was employed in order to avoid this, there was the risk in the face of the occurrence of erysipelas, or of sloughing of the patch of skin. Whatever they did in the treatment of lupus, it must be their endeavour to produce as much scar tissue as they could, and to reduce as much as possible the number of nodules. He had found that some other preparations, such as oleate of mercury, acted quite as well as Brooke's ointment as a means of introducing antiseptics into the skin. There was one remedy which Dr Walker had not mentioned which he thought was of extreme value in lupus, namely, carbolic acid. Pure carbolic acid painted frequently over a patch of lupus lessened, though perhaps slowly, the number of nodules in the patch. It produced a greater density of the tissue, and apparently led to a condition of the soil which was less suitable for the growth of the bacillus than before. Blisters no doubt did good. They acted much in the same way as an attack of erysipelas. Still it must be looked upon as merely a preliminary measure. It probably acted much in the same way as tuberculin, causing hyperæmia around the lupus nodules, and for a time disappearance of the obvious symptoms. Before using the cautery, he found the employment of the ordinary dental burr of great value. He used it as a drill, and drilled it into each nodule. He used in general a fine thermo-cautery. He did not think that the increased congestion caused by the galvano-cautery was an advantage. What often threw their cases back as much as anything was the influence of cold. When the patients were exposed after treatment in hospital wards to cold atmospheres and winds there was apt to be a relapse. They therefore should endeavour, as far as possible, to keep the patients warm.

Mr Joseph Bell said that it seemed to him that one of the greatest things they could do to help the cure of lupus would be to explain, both to the profession and to the public, that lupus was a disease of extreme gravity, as bad as cancer, and that it should be treated surgically as soon as the first sign was seen. It was no use waiting to see the effects of constitutional treatment. There

was not the slightest doubt that the best way to treat lupus of the limbs was to excise it freely. But in the face, they had to provide for the future appearance of the patient. He used a sharp spoon. The smaller and sharper the instrument was, the better. Squire's spoon, even, was too blunt. After scraping out the nodules, he applied a strong solution of chromic acid. Every person had their own views with regard to the local method of destroying the apple-jelly nodules. Constitutional treatment had not very much effect. The disease should be treated, like cancer, early and heroically.

Mr Alexis Thomson said he wished to give his opinion in favour of treatment by excision. He had made sections of lupus, and seen that the nodules were not on the surface, and therefore not removable by ordinary scraping, and he had seen cases in which scraping had been carried on into the teens of years. The nodules were underneath, and separated from the reach of the spoon by dense fibrous tissue. He would not give in to the view that excision should be limited to parts where only a linear scar was allowable. The disfigurement that was left was less than what resulted when other methods were used. By Thiersch-grafting especially one was able to get a good result. His only difficulty with Thiersch-grafting had been, not that he did not get healing, but that the hairs on the graft when it was taken from the thigh developed to such an extent that they became unsightly.

Mr C. W. Cathcart said he would like to have Dr Walker's opinion upon an interesting point, into which he had not entered. It was a striking fact that tubercle bacilli might be on the surface of the skin for years as lupus, and not affect glands or give other manifestations. Another remarkable fact was that the typical tubercular ulcer had undermined edges. When the tubercle bacillus attacked the surface of the skin it spread along and did not extend deeply. Might not the explanation of these facts be that the corium acted as a barrier to the tubercle bacillus?

Dr Norman Walker, in replying, said he was sorry to differ from Mr Miller on one point. As far as his experience went it was incorrect to say that the central or cicatricial area in lupus could be safely left alone. One of the main points in the diagnosis from a syphilitic scar was that the tubercular one was not healthy. The syphilitic was much whiter. Nodules almost always arose again in the lupus scar. It was true that it was impossible to scrape away the deep nodules. It was also to be remembered that they were often so small that they could not be seen with the naked eye. There might be something in Dr Jamieson's contention that the fibroid form of lupus was due partly to position. But while he had seen only one case at all comparable to it on the face, he had seen a good many of the ulcerative and apple-jelly forms on the limbs. He did not agree with Dr Jamieson that the effect of blistering was comparable to that of an attack of erysipelas. He

could not see how the corium could act as a barrier to the tubercle bacillus. Against such a view there was the fact that lupus of the face did not spread any more than lupus of other parts where the corium was thicker.

2. ON SYPHILITIC NODOSE PERIARTERITIS.

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THE object of this communication is to draw attention to the existence of a variety of arterial disease specially affecting the adventitial sheath (in the form of either nodular swellings or diffuse thickenings), which has been, in this country at least, not sufficiently recognised by pathologists; to show the ætiological relationship of some of the forms of this affection to constitutional syphilis; and to inquire whether it may not be possible, in some cases, to diagnose its presence during life.

Nodose periarteritis, as the condition has been very happily termed, can hardly be said to have found a place in English text-books of pathology. So far as the writer is aware, the best short reference to it is to be found in Ziegler's *Lehrbuch der Path. Anat.*, seventh edition, vol. ii. p. 67, where it is referred to as "a peculiar but as yet imperfectly explained process, which produces a cellular infiltration and proliferation of all the coats of the vessels, separating and causing limited necrosis of their elements; . . . . and as being associated with thrombosis, aneurismal dilatations, and in its severer forms with inflammations of the surrounding tissues." There is no reference to its connexion with syphilis, although it is pointed out (p. 66), in the description of obliterative endoarteritis due to syphilis, that one of its distinctive features is the cellular infiltration of the adventitia which accompanies it. Most other text-books overlook the condition altogether, and those that note in connexion with obliterative endoarteritis any infiltration of the outer coats appear to regard this as subsidiary or secondary to the endoarteritis (*Transactions of the Pathological Society of London*, 1877). This is presumably in large measure due to the comparative rarity of the periarterial disease as distinct from obliterative endoarteritis, and to the influence of the monograph of Heubner on the syphilitic affections of the cerebral arteries, in which the infiltration of the outer sheath is not even mentioned.

Several papers, however, have appeared in various journals which give a more or less exhaustive account of the histological changes, and at the same time teach that there are at least two, and possibly more than two, sets of causes of the disease; while they leave little doubt that one of these causes is constitutional syphilis.

Before discussing these papers, it may be well to state here the

details of two cases which have come under the writer's notice,—one after death while he was pathologist to the Edinburgh Royal Infirmary, and the other during the last three days of life.

CASE I.—B. D., aged 37, the male attendant in the Lock Ward, Royal Infirmary, died January 23, 1887. Dr MacGillivray, under whose care he was, gave the following history along with the kind permission to publish the case:—Syphilis acquired between two and three years before death. Secondary symptoms severe, accompanied with a pustular rash. Tertiary symptoms appeared about eighteen months after the original infection, and were mostly limited to the nervous system,—partial paralysis of the right side, which improved under large doses of iodide of potassium; subsequently paresis of both legs, and some affection of speech (anarthria?); then diplopia and inability to turn the right eye inwards were developed. Improvement followed the use of iodide of potassium; but diplopia afterwards returned, and the left pupil dilated and became immovable. (There was probably also external ophthalmoplegia.) Death occurred somewhat suddenly, in six hours after development of tonic and clonic convulsions, which alternated from one side of the body to the other. The results of the post-mortem examination (which was held on January 25) were, omitting unimportant details, as follows:—

Ecthymatous eruption on forehead, near hairy scalp; slight external strabismus; left pupil considerably larger than right. Inner surface of frontal, parietal, and occipital bones had a grooved appearance along the lines of the finer vessels. The bones generally seemed to be too vascular. Considerable amount of fluid in subarachnoid space at base of brain; arteries at base were greatly altered. The basilar, posterior communicating, and posterior cerebral arteries were thickened irregularly, and had a whitish, soft, almost succulent-looking wall. On the vertebral arteries near their termination in the basilar were several external nodular thickenings, resembling, in miniature, the gnarled masses which are seen on elm trees. On some of the smaller branches of the basilar artery to the pons there were small, either fusiform or rounded, swellings. The pons itself was somewhat swollen and soft. Both optic nerves were also too large and soft. Right third nerve a little swollen, gelatinous looking, and of a more pinkish colour than its fellow.

The lungs were both greatly congested; the heart showed much fat (fatty infiltration?) under the pericardium over the right ventricle; valvular orifices all competent. Left ventricle dilated; wall not thickened; in a state of advanced fatty degeneration (apparently the result of endoarteritis in coronary artery, but this point not subsequently established). Papillary muscles atrophied. No change of importance was found in the other organs, with the exception of the spinal cord (which was found somewhat softened)

and its membranes. On the inner surface of the dura mater, in the cervical region, were a considerable number of small, wart-like excrescences.

The microscopic examination of the arteries at the base of the brain showed that there was only a very slight trace of obliterative endoarteritis (Plate I., Fig. 1, drawn from a transverse section of the basilar artery, stained with alum carmine); but that, on the other hand, the adventitia is enormously thickened. This thickening is not uniform over the whole circumference. On one side it has developed so as to form a distinct node, while on the other it is only slightly thicker than the normal adventitia. The margins of the node slope gradually away into the thinner adventitia; but in some other sections the transition was still more abrupt, so that the node was even more apparent than in Fig. 1. In a third series, observed specially in the smaller vessels derived from the basilar, the nodular swelling was not so pronounced, because the thickening all round the vessels was more nearly uniform. The infiltration is composed of small round and fusiform cells. These are here and there aggregated into dense masses, especially round the vasa vasorum. In other foci they show a commencing caseation, indicated by a blurring of the outlines, and an indistinctness of staining of the nuclei of the cells. The muscular coat is generally normal, but it shows one or two small foci of small cell infiltrations. Its elastic lamina is quite intact. The pia mater was not specially altered, so that one cannot suppose that the affection of the arteries was secondary to a specific leptomeningitis.

Sections of the crura cerebri showed that there was a line of softening along each side of the artery to the nucleus of the third nerve, and the nucleus itself was entirely destroyed by softening. The capillaries and smaller arteries in the crura showed marked perivascular cellular infiltration.

CASE II.—J. B., aged 35, an obstetric nurse, was, on the recommendation of Dr Whitelaw of Portobello, admitted to Ward 25 of the Royal Infirmary, September 18, 1892, suffering from paralysis of the upper and lower extremities, and a peculiar form of disturbance of speech,—symptoms which were said to have developed on the day of admission. When examined on the following day, it was difficult to get a connected history from her. Her expression was quite that of an intelligent person, but indicated great mental distress. She was quite conscious, and answered questions put to her after some delay and in a few words, which were uttered in a peculiar, slow, wailing manner, in a loud tone, with frequent interruptions. The manner of speech was so strange that the students who were present at the clinique freely expressed the opinion that she was hysterical. The movements of the ocular, facial, and of the head and neck muscles were quite normal.

There was some difficulty in protruding the tongue, which, however, could be passed beyond the lips and in the middle line. The arms were kept with the hands crossed in front of the abdomen, the elbows being slightly flexed, the wrists semi-flexed, and the fingers flexed at the two distal phalangeal joints. The flexion could be slightly increased on voluntary effort, but the extensor muscles were completely paralyzed. Slight movements were made at the shoulders and elbows on voluntary attempts to shut the hand. The right hand was slightly more powerful than the left. There was slight resistance to passive movements at both shoulders and elbows. Both arms and forearms were spare. The faradic reactions appeared to be slightly diminished in both arms. Elbow and wrist jerks were present on both sides. The lower limbs were extended, the toes pointed, but not everted. The only voluntary movements in the lower limbs were slight flexion of the toes. The limbs were thin, but no special wasting was noted. There was increase of knee-jerk on both sides, but no ankle clonus. The faradicreac tions seemed slightly diminished. There was retention of urine. After being drawn off by catheter, it was found to be normal. Cutaneous sensibility was everywhere normal.

A vague history of possible syphilitic infection was obtained, but its date could not be ascertained. A few brownish pigmented spots on the outer sides of the elbows and knees, and on forearms and legs, were regarded by Dr Norman Walker, who kindly saw the patient with me, as confirmatory of this history. No glandular enlargements were found anywhere. The temperature on the evening of admission was 99°·4. On the following day (19th September) it was 97°·6 in the morning and 100°·4 in the evening. On 20th September patient appeared distinctly better, was more cheerful, and could move her hands slightly better. Had slept well. Temperature: morning 100°, evening 101°·4. On 21st September, at the Resident Physician's visit at 10 A.M., temperature 100°·2. Hands could not be moved so well as yesterday. At 1 P.M. temperature had risen to 101°·8; pulse, 118; respirations, 48. Coarse râles in trachea; moist crepitations, with no evidence of consolidation in either lung. Neck is paralyzed; tongue cannot be protruded beyond lips; ocular and facial muscles normal. At 6.45 P.M. temperature 103°·4; at 8 P.M. it was 104°·2; pulse, 142; respirations, 60. At 10 P.M. breathing stopped suddenly, the pulse continuing fully one minute after its cessation.

The case presented so many features in common with the one already described, that it seemed most probable that the cause of death was of a similar nature; and an opinion was expressed before the post-mortem examination was made, that there was in all likelihood syphilitic periarteritis of the arteries at the base of the brain involving the centres in the medulla below the nucleus

of the facial nerve, and leading to softening of the pyramidal tracts.

After the post-mortem examination the following additional facts were obtained, through the kindness of Dr Sharkey's Resident Physician:—

J. B. had been treated for secondary syphilis at Soho Hospital for six weeks during March and April 1892; the date of the primary infection having been apparently December of the previous year.

May 10.—Three weeks after leaving off mercurial treatment she noticed loss of power in her left arm.

May 29.—She could not speak properly for a few hours.

May 31.—Admitted to St Thomas's Hospital with syphilitic psoriasis of trunk, face, and extremities, which was said to have existed eight or nine weeks. Both tonsils were ulcerated. Right side of face was paretic; tongue protruded to right side. Grasp of left hand very weak; that of right hand stronger, but not yet normal. Trunk muscles very weak. Could not raise herself from the bed. Neck muscles not powerful enough to support the head. Left leg weaker than the right, but both affected. No true aphasia (evidently some speech difficulty—A. B.) No loss of sensation anywhere. Does not always understand what is said to her. Requires to be fed.

June 3.—Very drowsy; unconscious micturition. Right optic neuritis, with small hæmorrhages; left optic neuritis; slight swelling of disc.

June 6.—Paralysis much worse, is general. Great pain in neck; no loss of sensation anywhere.

June 7.—Paralysis of neck complete. Patient clear and quite intelligent.

From this date rapid improvement till complete recovery. Exit from hospital on August 18, with strict injunctions to continue her medicines, and always to keep her prescriptions (iodide of potassium and perchloride of mercury) to show on any future occasion.

Her sister stated that she then came to Portobello; that while there she was able to walk about, but that she still preserved some difficulty in speech. She remained fairly well till two days before admission, when she began to complain of pain in the back of the neck. On the evening before admission she felt her legs weak; but next morning—*i.e.*, on the day of admission—she was able to get out of bed before the paralysis came on.

The post-mortem examination was made by Dr Muir on September 23, 1892:—

Body fairly well nourished; rigidity fairly well marked in upper and lower limbs; lividity well marked posteriorly. Slight discoloration over abdomen (due to putrefaction). Left pupil points a little more upwards and to the left as compared with the right.

Head.—Dura mater normal. Convolutions at vertex fairly normal. At the base of the brain there is found, on the anterior surface of the pons and medulla, a thin, soft, gelatinous-looking layer of exudation, showing at parts a fibrinous appearance, especially at the anterior surface of the pons. Behind the optic chiasma there is considerable subacute thickening of the membranes. The basilar and vertebral arteries are the seat of extensive disease, their walls being thickened somewhat irregularly, with small, somewhat greenish-looking patches on their outer coat. The branches of these vessels are more rigid than usual. They are thickened and translucent, and also show little patches of yellowish translucent thickenings. The exudation is found round most of the cranial nerves, but in no case is fibrinous. The middle and anterior cerebral arteries show a little thickening of their coats, but not nearly to the same extent as the basilar.

The brain substance is firm and pasty; puncta cruenta well marked; grey matter of cortex deeply congested, especially in deeper layers, where it is of a rose-pink colour. The grey matter in the basal ganglia is greatly congested. The grey matter in the pons and medulla is greatly congested, and in the medulla this is rather more marked on the left side. In the centre of the pons, just anterior to the fillet on the left side, is a small spherical spot, apparently a minute softening, $\frac{1}{8}$ of an inch in diameter. The spinal cord showed marked congestion of the leptomeninges. The grey matter was much congested in places, and the white matter somewhat softened.

The pons varolii and medulla oblongata were prepared for microscopic section by being hardened in Müller's fluid and imbedded in celloidin in the usual manner. Changes were found in the leptomeninges, arteries, veins, capillaries, and also in the medulla and in the nerve-roots arising therefrom.

Leptomeninges.—The pia arachnoid on the anterior and lateral aspects of the medulla and on the anterior aspect of the pons showed a considerable amount of infiltration. The thickening was not by any means uniform, being almost quite absent here and there, and in other situations so great in amount as almost to constitute a nodule. It was due mainly to small round cells lying in the interspaces between the fibres; where these were present in very large masses the membranes presented the nodular appearance above referred to. In addition to these cells there was also a considerable amount of fibrin in layers between the fibres. The greatest cellular infiltration was in the anterior median fissure and in the neighbourhood of small arteries and veins in the membranes (Plate I., Fig. 2). This condition evidently corresponds very closely to that termed *meningo-myelite diffuse embryonnaire* by Gilbert and Lion.

The *arteries*—namely, the vertebrals, the basilar, and the small branches arising from them and passing along the leptomeninges—

showed well-marked periarteritis of a character somewhat different from that described in Case I. It is in part diffuse and partly nodular,—the difference being due to the greater or less uniformity in the thickness of the infiltration of the adventitia; the nodular appearance being due to a much greater amount of infiltration at one part of the circumference than at another. The infiltration (Plate II., Fig. 1) was composed entirely of round and spindle cells with deeply staining nuclei. These cells were very closely packed in the sheath, and in some parts, especially round its small capillaries, were collected in still denser masses, which might almost be termed miliary gummata. They differed from the previous case, however, in this respect, that they did not show any tendency to caseation in any spot. The muscular coat was infiltrated in many foci by similar round cells. The elastic lamina seemed intact, neither granular nor split into layers. In the intima there was a certain degree of endoarteritis obliterans. Only in one or two small areas was this at all pronounced, elsewhere it was either entirely absent, or (Plate II., Fig. 1) represented by two or three rows of endothelial-like cells. Where the endoarteritis was most marked it was due to round deeply-staining cells, as if it had developed rapidly. No capillaries were found in the thickened intima. Recent thrombi were found at several places in the arteries, especially in the smaller branches.

The infiltration of the adventitia was not limited to the arteries in the meninges. It extended along the minute branches within the medulla, forming very prominent rings of deeply-staining cells in sections stained with Ehrlich's hæmatoxylin. These branches were generally thrombosed (Plate II., Fig. 3).

The veins of the meninges had in their outer coats an infiltration almost as marked in degree as in the arteries, and of a very similar nature—a periphlebitis diffusa—the adventitia (Plate I., Fig. 2) being thickened uniformly by deeply-staining round cells. There were in many places hæmorrhages, some of considerable extent, in the outer sheath. The middle and inner sheath were for the most part normal. The majority of the veins were thrombosed.

The *capillaries* in the outer coat of the arteries in the meninges have been already referred to as being frequently the centre of aggregations of round cells (early gummata). In sections of the medulla stained by Ehrlich's hæmatoxylin they stood out very prominently, owing to the increased number of nuclei in their walls and in the perivascular lymph spaces.

The *medulla* and *pons* showed a considerable degree of myelitis and softening. Though they were hardened and embedded with great care, it was almost impossible, owing to the friability of the tissue, to cut complete sections. When stained by Weigert-Pal's method, the anterior pyramids became almost entirely decolorised, showing that they were evidently very much degenerated. Other foci in the groove behind the inferior olives, where the meningitic

infiltration was most intense, also showed a similar condition. Sections stained by Ehrlich's hæmatoxylin showed that there was a remarkable excess of nuclei, throughout, between the nerve fibres.

The *nerve roots* (of which the drawing in Plate II., Fig. 2, made from a section of the hypoglossal, may be taken as a type) show also a high degree of perineuritis and interstitial neuritis.

The study of the published cases of periarteritis nodosa shows that they may be readily divided into two classes, according as they are or are not due to syphilis.

It is not yet determined whether the non-syphilitic varieties are all due to the same cause. Indeed, no cause has yet been established in any of the cases, but the clinical course and the post-mortem appearances certainly point to an "infective" origin. In most of them there were enlargements of the spleen and liver, granular degenerations in muscle, infarctions in the kidneys, and hæmorrhages into, or erosions of the intestine. This question has been so very fully discussed by Dr Morley Fletcher (*Ziegler und Nawerck's Beiträge*, vol. xi.) that it is unnecessary for me to enter into it in detail. The histological changes of the non-syphilitic forms differ considerably from those in the syphilitic cases, and it is remarkable that in the former, with one exception, the cerebral arteries escape, while in the latter it is these alone that are affected.

Thus, in Kussmaul and Maier's case (*Arch. f. klin. Med.*, Bd. i.) there were minute nodular, aneurism-like swellings of the smaller arteries of most of the organs (with the exception of the brain) and the muscles of the body. These nodules are due to cellular infiltration of the outer and middle coats, with subsequent degenerative changes. The infiltration sometimes spread to the intima, and induced thrombosis in the vessel. There were also infarctions in the kidney, with albuminuria, hæmorrhagic erosions in the stomach, and hæmorrhages into the intestine. The voluntary muscles showed whitish spots (due to the arterial changes), resembling the nodules in thickness macroscopically, while the fibres were cloudy and swollen.

2. In Weichselbaum's case (*Allgem. Wiener Medic. Zeitschrift*, 1877) there were numerous little aneurisms full of thrombi on the small arteries; dysenteric ulcers in the colon; acute liver abscess; slight localized peritonitis and pleurisy.

3. In Meyer's case (*Virchow's Archiv*, Bd. lxxiv.) there was enlargement of liver and spleen; infarcts in the kidney; numerous small nodular thickenings on the small arteries, but none on the cerebral arteries. This patient had had syphilis; but after death no trace of it was found, unless the arterial change be regarded as such.

4. In Eppinger's case (*Pathogenesis, etc., der Aneurysmen*), that of a girl of 10, there were minute nodules on the coronary arteries of the heart, but the other arteries were not observed.

5. In Morley Fletcher's case (*loc. cit.*), the arteries of the heart, mesentery, stomach, intestine, kidneys, liver, and spleen presented small nodular swellings, due to localized cellular infiltrations of the intima, media, and adventitia. The spleen and liver were enlarged, and there were hæmorrhages into the mucous membrane of the stomach and intestine. Fletcher considers that his own case was due to some general infective cause.

If we turn to the syphilitic form of the disease, we find from the recorded cases that the arteries specially involved are those at the base of the brain, more especially the vertebrals, basilar, and the posterior communicating, as well as the smaller branches which arise from them, and also, although probably with much less frequency, the anterior middle and posterior cerebral. The periarteritis may either exist alone, or it may be associated with endarteritis obliterans. Similar changes may be found in the outer and inner coats of the meningeal veins. Very frequently the vascular changes are associated with a diffuse basal meningo-myelitis, with foci of softening in the nerve centres, and interstitial cellular infiltrations of the cranial nerves.

It would appear that Dr Batty Tuke was the first to observe this periarteritis. In the *Journal of Mental Science* for 1874, he describes an affection of the arteries of the cortex in a case of syphilitic insanity four years after infection, which is undoubtedly a periarteritis. Dr Tuke was good enough to allow me to examine his section of the cortex, and from them it is easy to see that the outer coat is infiltrated with round cells in a more or less uniform manner. A transverse section of one of the arteries in the cortex presented appearances almost exactly like those in the large thickened artery lying immediately under the membranes in Plate II., Fig. 3.

Since then two cases have been described by Baumgarten (*Virchow's Archiv*, vols. lxxvi. and lxxxvi.), one doubtful case by Weichselbaum and Schwostek (*Allgem. Wiener med. Zeitschrift*, 1877), and more recently important papers have been written by Gilbert and Lion (*Archives Générales de Médecine*, 1889, vol. ii.), Lamy (*Nouvelle Iconographie de la Salpêtrière*, Nos. 2, 3, 4, 5, 1892), Raymond (*Archives de Neurologie*, xxvii., 83, 84), and others. Raymond describes appearances which are almost identical with those presented by the writer's second case. From an examination of these cases, and a comparison of them with those described by the writer of this paper, the changes in the outer coat may be divided into three pretty distinct groups.

I. The outer coat is infiltrated more or less uniformly with round cells, but without any, or any markedly evident tendency to degeneration. This group includes the cases described by Tuke, Gilbert and Lion, Raymond, and Bruce (Case II.).

II. The outer coat shows a nodular (or a diffuse) cellular

infiltration, with commencing caseation. Bruce's first case of B. D.

III. The outer coat shows a distinct formation of caseous gummata, as well as diffuse periarteritis. This stage is seen in Baumgarten's (*l. c.*) two cases. He describes (and figures) the following conditions in the cerebral arteries in addition to other lesions:—"A number of small yellow or greyish nodules on the arteries at the base of the brain, on the pia mater of the left side of the pons, and scattered singly over the pia of the cerebrum and cerebellum." There were also nodules on most of the cranial nerves. Microscopically the arteries showed an obliterative endarteritis with giant cells; in the media and adventitia caseating nodules, which may become continuous with the thickened intima. When this is the case, the thickening of the intima is always much less marked than that in the outer coats. There is also a diffuse periarteritis in parts, with, at the same time, a thickening of the intima.

Since these three groups may be regarded as representing three successive stages in the development of a gumma in the outer coat of the artery, one is led to inquire whether there is any marked difference in the interval between the original infection and the appearance of the symptoms, or in the duration of the disease,—if, for instance, the cases included in the first groups appear earlier and run a more acute course than those in the second and third groups.

At present the number of cases is insufficient to enable one to come to a definite conclusion on these points, and it is to be remembered that the rapidity of progress of any case will depend on many factors. One of these is the relation of the affected arteries to centres whose integrity is necessary to life. Thus the diffuse cellular infiltration might continue to extend for a considerable time before it reached an important centre, and thus the affection might run a comparatively chronic course (see Gilbert and Lion, *loc. cit.*); while, on the other hand, the caseating forms might, in the first instance, mainly affect the vessels to the respiratory or cardiac centres, and thus give rise to an illness with an apparently short course. Again, a great deal will depend on the existence or not of meningitis, encephalitis, neuritis, and of intra-vascular clotting. (This has been also considered by Raymond, *loc. cit.*)

It is noteworthy, however, that in the majority of the described cases, when a definite date of infection could be established, the symptoms appeared at a very early period. Gilbert and Lion speak of them as appearing even before the primary manifestations of syphilis have passed off. In the writer's second case they occurred while the patient was under treatment for the skin eruptions about six months after the infection. In his first case they appeared within two years (or perhaps less). In two of Lamy's cases the symptoms appeared within a year after infection. In Batty Tuke's and in one of Baumgarten's cases the syphilis

had lasted four years at least (in the other there was no history).

No record of a case has been found in which a definite periarteritis (as distinguished from the periarterial infiltration so often associated with obliterative endarteritis) has been seen more than four years after the primary infection. It is not meant by this to deny that such cases may occur. Yet it would appear that the earlier the occurrence of cerebral (or spinal) symptoms, the greater the probability that they are associated with periarteritis.

The symptoms of periarteritis nodosa are most various, and the progress of the disease may be one of extreme rapidity, or one lasting for weeks or months. Some of the cases have showed marked and rapid improvement under specific treatment, followed by relapses which have proved speedily fatal. Frequently there are no special premonitory symptoms; or there may be headache, giddiness, or pains in the region of the head and neck. Then there may develop more or less suddenly symptoms of mania, convulsions, unconsciousness, paresis or paralysis of the muscles supplied by the various cranial nerves, hemiparesis of arm and leg, complete hemiplegia, or paraplegia. These conditions are the same as those found with ordinary obliterative endarteritis and its complications, and are probably to be asociated with periarteritis and periphlebitis only when they occur comparatively soon after the disease is contracted.

With regard to treatment, the history of these cases emphasizes the urgent need for persevering with the specific remedies for long periods after the early nervous symptoms have disappeared.

EXPLANATION OF THE PLATES.

PLATE I., FIG. 1.—A transverse section of the basilar artery, showing the infiltration of the adventitia with small cells, which in several areas are becoming caseated. The muscular coat at one spot is slightly infiltrated. There is also slight endoarteritis. (Case I.).

PLATE I., FIG. 2.—Transverse section of leptomeninges and vessels of medulla, from the groove behind the olive, showing the infiltration of the membranes, the thickening and thrombosis of the veins and arteries, and the interstitial inflammation of the nerves.

PLATE II., FIG. 1.—Artery from Case II., showing marked periarteritis, very slight focal infiltration of middle coat, and slight endoarteritis.

PLATE II., FIG. 2.—Infiltration with small cells of the perineurium and endoneurium of the hypoglossal nerve.

PLATE II., FIG. 3.—Low power view of the membranes and medulla, showing the infiltration of the outer coat of the smaller arteries and capillaries passing into the medulla.

Surgeon-Major Black remarked upon the prevalence in the army of aneurism due to syphilitic disease of the arteries.

The President said that the lesson of Dr Bruce's paper was that in cases of syphilis the iodide should be continued for years after

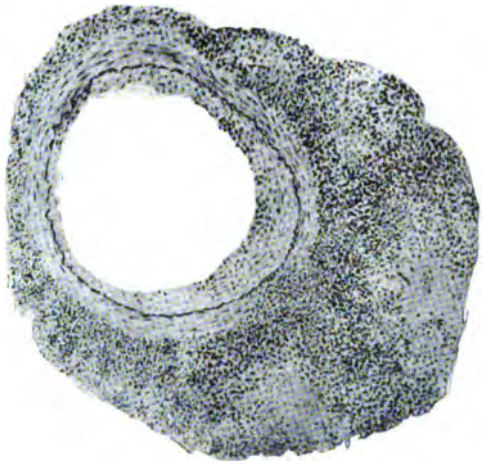

FIG. 1.

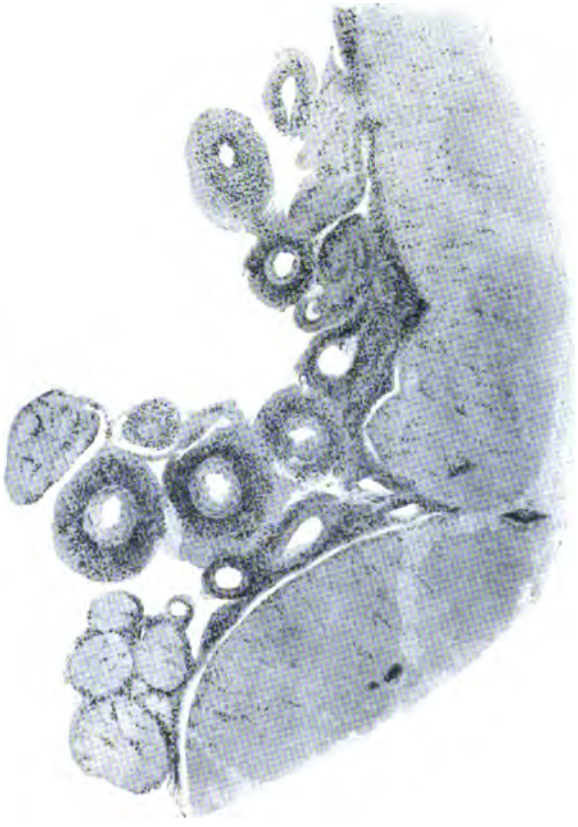

FIG. 2.

FIG. 2.

FIG. 1.

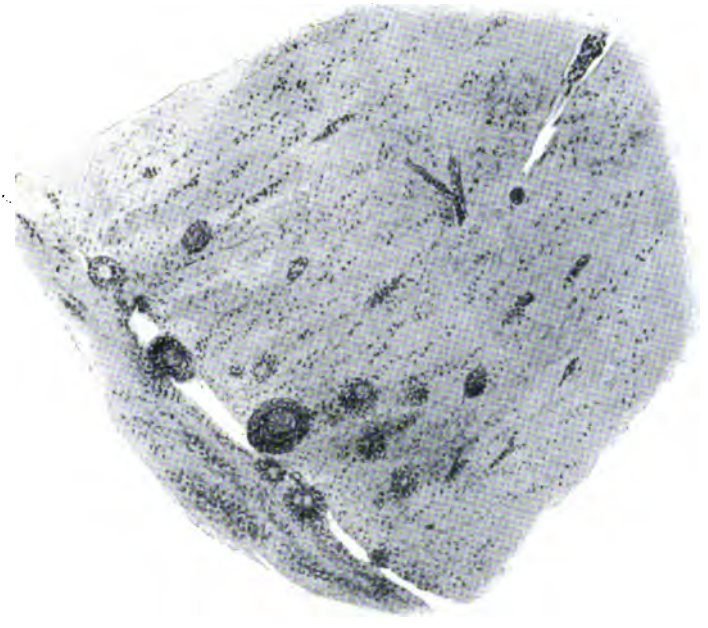

FIG. 3.

symptoms had disappeared. It was difficult to get patients to carry out the treatment, but it was exceedingly important that they should.

Mr C. W. Cathcart asked if the symptoms which preceded death were due to thrombosis of the arteries, or to meningitis?

Dr Bruce, in replying, said he had no doubt that the rapid progress of the case was more largely due to thrombosis than to the meningitis. Almost every one of the vessels were thrombosed. There was a distinct amount of softening in the medulla. He had no doubt there was a distinct encephalitis as well as a meningitis. His reason for bringing the cases before the Society was that he believed the condition was a more common one than was usually suspected.

3. *Dr Dawson Turner* read the following NOTE ON THE ACTION OF IODINE:—

The value of iodine as an absorbent and counter-irritant had long been known. It was used to cause absorption of enlarged glands, thickening due to chronic inflammation and severe effusions, and this action was believed to be due to a stimulation of the lymphatic system. Perhaps the most remarkable results due to the action of iodine as an absorbent were those which were attained by Major Holmes and Captain Cunningham in the treatment of goitre in India. They recommended that the enlarged thyroid should be smeared over with the red iodide of mercury ointment, and that then the patient should be made to sit with his neck exposed to the rays of the sun, or of a hot fire, for many hours. The results were extraordinary. Sixty thousand natives were treated gratuitously in two years, and a cure was commonly effected. (*Vide* "Goitre," *Quain's Dictionary of Medicine.*)

Dr Turner's object in this communication was to offer a suggestion from the point of view of the physicist as to the mode of action of the iodine in these cases. We use iodine in physical experiments to cut off the visible rays of the spectrum. A solution of iodine in bisulphide of carbon will quench the visible rays of the sun, but will transmit the invisible heat rays. The solution is, in fact, remarkably transparent to the heat rays,—it is diathermanous. Prof. Tyndall in 1868 was the first to point this out. Now, the fact that Major Holmes found that the action of the red iodide of mercury was much intensified by exposing the patients to the direct rays of the sun appeared to Dr Turner to depend upon the physical action of the iodine that had been mentioned. He offered this as a suggestion. Further, the fact that the *red* iodide is the most efficacious points in the same direction, because the red substance would also serve to transmit the heat rays only. The solar radiation would be filtered by the application, and the gland would be subjected to the full blaze of the calorific rays without the vibration of its molecules being altered by the visible

rays. The action of iodine when applied externally for swollen glands or enlarged knees may also depend upon this physical property. He concluded with the suggestion that such cases might also be benefited by exposure after the application of the iodine to the radiant heat of a hot fire.

Dr William Craig said he would like to ask whether iodine in a state of combination with other elements had the same effect upon the sun's rays as it had when in a free state, because he had always understood that the action of iodine in a free state was very different in all respects from its action in a state of chemical union.

Dr W. Allan Jamieson said that it had lately been observed that if the face was coated with a brown varnish sunburn was not produced to the same extent. Iodine produced a distinct brown colour on the surface, and he would like to know if iodine used in solution produced the same effect as, for example, red iodide of mercury, which of course had quite a different colour.

Dr Dawson Turner, in replying to the remarks made by Drs Craig and Jamieson, did not know how much the action of the iodine would be masked by the presence of the other ingredients in the ointment, nor had he had an opportunity of measuring the absorption produced by the red iodide ointment. It was not from a study of the effects produced in disease by this ointment only that he had ventured upon making the suggestion, but from the consideration of the general uses of iodine in solution in producing absorption. The brown colouring matter to which Dr Jamieson alluded would probably serve to absorb the visible rays of the spectrum; but without an experiment, it would be difficult to say what rays it would transmit. Prof. Tyndall found that brown paper was at once set on fire by obscure radiation,—*i.e.*, that it was a powerful absorbing medium for the invisible rays, as we also know that it is for the visible rays.

Note added later.—He found that Prof. Tyndall made some experiments with the red iodide of mercury rubbed on paper, and found that while it absorbed the luminous rays it transmitted a large proportion of the invisible heat rays. Hence it fell into line with the simple iodine.

Meeting IX.—May 16, 1894.

Dr Clouston, *President, in the Chair.*

Dr J. Halliday Croom opened a Discussion on MASSAGE AS AN ADJUVANT TO MEDICAL, SURGICAL, AND GYNÆCOLOGICAL PRACTICE, by reading the following paper:—

Mr President and Gentlemen,—My object in the following remarks is not to attempt any detailed account of massage and its

accessories. This is a task which the twenty minutes placed at my disposal would be insufficient to overtake. All I desire to do is to make some general observations upon this method of treatment so far as my own limited experience is concerned, by way of initiating a discussion, so that the Society may hear the opinions of those who have a much greater right to speak on the subject than I have.

The subject you have selected for discussion is by no means a novel one, for in a primitive form it was known to both the Greeks and the Romans, by whom it was used especially after the bath. Homer, too, sings of beautiful women who, by rubbing, refreshed war-worn heroes after the toil and heat of the battle; and Hippocrates says that a physician must be experienced in many things, but especially in rubbing. The practice was known to the Chinese 3000 years B.C., and the Sandwich Islanders employed methods of treatment which were only massage carried out in a somewhat unscientific manner. Plutarch tells how Cæsar was cured of general neuralgia by being manipulated daily by a slave. It seems that the Greeks and Romans obtained their knowledge of mechanotherapy from the Hindoos and Chinese, and the celebrated maxim "Mens sana in corpore sano" comes to us from Democritus. With the Hindoos a method of treatment allied to massage goes by the name of "shampooing." In all the ancient systems some form of motion played the principal part, and now modern medicine recognises the good effects of massage in mental and physical development, and in the "prevention" and cure of disease. But I need not trouble you by any further reference to the ancient history of massage, which is, at best, of secondary interest at a meeting such as the present.

Massage is defined by Murrell as "a scientific mode of treating certain forms of disease by systematic manipulation." The word "massage" really means kneading; yet this is but one of the many movements employed. This process of kneading can be carried out when soft tissues such as muscles are manipulated, but when the part to be operated upon is bony or resistant, kneading is out of the question, and other methods are called into play.

It was long before physicians accepted this form of treatment, and it remained in the hands of mere quacks and uneducated persons. That day has happily long gone by, and the treatment has received the approval of the Faculty generally. Fortunately, there has grown up quite a large section of able men who devote themselves exclusively to this department of therapeutics, and who now specialise entirely in massage.

It seems to me that this is entirely as it ought to be, because the time required, and the personal attention involved, not to speak of the physical exertion, render it impossible, or nearly so, for the general practitioner to devote himself with success to any number of these cases.

In regard to surgical massage I am, of course, not in a position to offer any opinion whatever; but as to its efficacy in loosening stiffened joints and in causing absorption of chronic inflammatory deposits in sprains, in neuralgia and rheumatism, as well as in spinal weakness and various other affections of ligaments and joints, I think there can be but one opinion as to its value and importance. I would rather refer to it as it is recommended in medical and gynæcological cases, and with regard to these there are four systems which are in common use, viz.:—

(1.) Simple massage, which consists in the systematic stimulation of individual groups of muscles by various movements and manipulations, especially effleurage, pétrissage, friction, and tapotement.

(2.) The so-called Weir Mitchell treatment, which is really a combination of seclusion, rest, electricity, overfeeding, and massage; or, as Playfair says, "a vicarious way of giving exercise to patients who cannot take it themselves."

(3.) The Swedish system of medical gymnastics embraces a great variety of manipulations and exercises, and is used in a large number of chronic diseases.

(4.) The Zander system is not, strictly speaking, a form of massage. Certain diseases are cured by mechanical exercises,—machines, some of which are most elaborately constructed, being employed for the purpose.

Beyond the following characteristic extract from an American author quoted by Murrell, I need not further refer to the last system:—

"From a big room on the second floor at No. 45 Randolph Street, above a wholesale grocery store and next to the apartments occupied by the Ethical Society, a noise comes forth all through the day which reminds the listener of the click of the looms in a cotton factory. If the person who hears the noise enters the room to investigate, a strange sight meets his gaze. A dozen machines, run by a steam-engine in one corner of the apartment, rattle and click in a monotonous way, and in the embrace of each is a human being, who is being shaken, kneaded, or rolled for the improvement of his health. There are several machines which have what can only be described as two rubber pads on the end of an iron stem extending out from them. These pads may be said to represent a human hand in motion, shaking horizontally, with about one hundred and fifty movements to the minute. The patient sits on a chair and places any portion of his body to the rubber pads. They take hold and shake with a vigorous, even motion, clutching the clothing, skin, and muscles like the hand of a living person."

As to the physiological effects of massage, these are by no means well understood. The art has been long practised; but to a large extent we can only theorise as to the physiological changes by which the good results are obtained.

Several observers have, however, made important and careful experiments, notably Gopadze and von Mosengeil. Gopadze, by experiments on four medical students, found that the effect of systematic massage for a week was to considerably improve the appetite, to increase the weight, and to increase the frequency and depth of respiration. The pulse became fuller and, as a rule, slower, while the body-temperature at first fell and rose again to normal. The surface temperature of the part massaged is raised even three or four degrees.

Prof. von Mosengeil, to whom we are indebted for placing the system on a scientific basis, also made a series of valuable experiments, and proved that massage promoted absorption by the lymphatics, so that in this way effusions and other morbid products are removed. He further proved that massage increases the contractility of the muscles on electrical stimulation. He found that a current which before had no effect readily set up a vigorous contraction of the muscle after a few minutes of massage.

Of its uses in medicine it would be difficult to say in what disease it has not been practised and for which its votaries have not claimed more or less success. For example, it has been used by some in cardiac and pulmonary affections, hysteria, dyspepsia, delirium, and even ague. So far as my own personal experience goes, I am conversant with medical massage only in three classes of cases—constipation, gall-stones, and neurasthenia. However, it is only due to massage to acknowledge gratefully the benefits I have myself derived from its use in rheumatism, and no one can doubt the good effects of this treatment in this and other diseases of the locomotory system.

With regard to constipation, which is so common and often so obstinate in women, I have seen many cases for the cure of which the Pharmacopœia has been ransacked in vain, but in which drugs when combined with the use of massage have, as far as one could judge, effected a cure. Those cases I have first of all treated by careful dieting, the administration of purgative medicines, and massage of the abdomen, directed especially along the line of the colon; and I have found that in the course of time the manipulation of the abdomen by a skilled masseuse, without the aid of drugs at all, was sufficient to effect a daily evacuation, while later still some cases were absolutely cured, the bowels requiring no form of stimulation whatever.

In using massage for constipation all forms of growths and adhesions must be carefully eliminated. Used in such cases it would be worse than useless; but if due to defective blood or bile supply, scybala, or imperfect nerve supply, massage is a most valuable remedy. Constipation is a most persistent enemy to the female sex, and in obstinate cases I have found no better mode of treatment than massage.

I have had occasion to observe benefit derived from massage in

cases of catarrh of the bile-ducts and atony of the gall-bladder. I am confident that with care very considerable benefit is to be derived from massage. I have on two occasions satisfied myself that calculi have been got rid of in this way, and the necessity for an operation has thus been avoided. I am not sure, however, that massage in these cases is altogether devoid of risk, for in one case I have seen a rather severe attack of peritonitis occur after the treatment had been completed.

I have seen, like many other physicians, many cases of "neurasthenia," especially cases which are supposed to owe their origin to some ovarian mischief. "Neurasthenia is a nervous weakness found especially among the rich and educated, and resulting from overwork, worry, loss of relatives, disappointed hopes, or as I have just indicated, as a sequel to some affection in some part of the system which, however, has nearly recovered, or at least ought to produce no effects on the general health."

The symptoms are a gradual but often alarming loss of weight; the patient becomes dull and listless, looks old and shrunken, and suffers from attacks of faintness and from coldness of the extremities, as well as from almost certain sickness and vomiting whenever food is administered. Those cases are allied to hysteria, but not always so. They are what Sir William Gull termed cases of "anorexia nervosa." No doubt, however, as the patients, as a rule, are weak nervous women who lack fat and blood, they are extremely apt to become hysterical. As Weir Mitchell says,—"A few are ennobled by long sickness, but far more often the result is to cultivate self-love and selfishness, and only too often one fatal element exists—the self-sacrificing love and sympathy of a relative or friend."

To Dr Playfair of London we are indebted in a very great measure for the introduction of the Weir Mitchell system into this country. The wonderful success which he obtained by the employment of this method has so popularised it that now there is scarcely a practitioner who has not given the treatment a more or less prolonged trial.

No man can be in practice for long without coming in contact with cases which Dr Weir Mitchell describes as suitable for this form of treatment. His words are:—"The cases which I have treated have been chiefly women of a class well known to every physician, nervous women who are thin and lack blood. Most of them have been such, and have passed through many hands and been treated in turn for gastric, spinal, or uterine troubles, but who remain at the end as at the beginning, unable to attend to the duties of life, a source alike of discomfort to themselves and anxiety to others."

As regards the treatment, the points insisted on are:—1. Seclusion (this, however, is not absolutely required in every case). 2. Rest. 3. Massage. 4. Electricity. 5. Dietary and Therapeutics.

The patient is first of all removed from her friends and her old surroundings in company with a skilled nurse, who must also be a masseuse. She is placed at rest, which in some cases is absolute, the patient being allowed to move not even a limb. This enforced rest has often a good mental effect. In other cases she is allowed to leave her bed for an hour or two every day and to recline on a couch instead. The patient is subjected to a course of electricity and massage, which are used once or twice a day as the cases may be, every muscle which can be reached being stimulated by the various manipulations. The last, and one of the most important elements in the treatment consists in dietetics and therapeutics. For the first week the patient is allowed nothing but two quarts of skimmed milk daily, and on this, as a rule, she loses weight at about the rate of ½ lb. a day. Then a very light breakfast is allowed in addition, and after a day or two a mutton chop for mid-day dinner. By the end of twelve days three full meals daily are allowed, as well as three or four pints of milk, and along with this 2 oz. of extract of malt. Indeed, the patient is steadily overfed, while the ill effects are prevented by the continuous use of electricity and massage. If she is unaccustomed to stimulants, after a time whisky or champagne are allowed, and iron is also administered. Sooner or later attacks of dyspepsia come on, or the urine becomes loaded with urates, in which case the diet must be diminished in quantity and quality for a time.

I cannot enter further into the details of the method. I know some of the recorded results are nothing short of miraculous. How great a part each of the elements of this method plays in producing the desired result it is difficult to say. For instance, seclusion is not necessary in every case. It is mainly in the hysterical cases that seclusion is most urgently demanded.

As to the cases which have passed beyond the borderland of sanity, whether they should be secluded, or even have Weir Mitchell treatment at all, in the presence of the President I should not presume to offer an opinion. But apart from this point it is quite certain that the rest and feeding would in themselves be impracticable were it not for the massage, which, by passive movements, render digestion possible. I have said that in many of the recorded cases the cures have been wonderful, but what about the failures? The most successful seem to have been those which are most advanced and in whom emaciation is extreme.

As far as my own experience is concerned I confess to disappointment. I admit that only two of the cases that have come under my care have been very advanced ones. In both of them there was very marked improvement, but nothing of pronounced cure I have read of as obtained by others. In both cases I attributed the improvement rather to the force of argument and moral suasion than to either massage or electricity. In all the cases that I have had to deal with I admit there has been marked

benefit, but the reports of many after leaving the Home have been unsatisfactory. The fault may be, probably is, mine, but such is the fact.

As regards massage in gynæcology, it was first recommended by Cazeau in 1844, who advocated its use for atony of the uterus during parturition; and every one has, of course, seen good results from friction under such circumstances.

Norstrom, in 1876, reported a case in which by massage he had been successful in curing chronic metritis, endometritis, hæmorrhagica, and prolapsus vaginæ. In 1818 Asp published the results of seventy-two cases, embracing chronic metritis, ulcerations, oöphoritis, chronic catarrhal troubles, perimetritis and displacements of various kinds which he had treated successfully by massage.

A. Reeves Jackson of Chicago recommends it in cases of early metritis, and considers that in the later stages it is of no use. He uses three different methods—(1), Abdominal massage; (2), abdomino-vaginal massage; and (3), abdomino-rectal massage. The treatment has to be continued patiently for several months, the sound being introduced occasionally to determine whether a decrease in the size of the uterus is taking place. Jackson says the abdomino-vaginal method is the most efficacious. The uterus being grasped simultaneously from within and without, is firmly kneaded and moved up and down, backwards and forwards, in every possible direction.

The operation consists in introducing two fingers into the posterior fornix behind the cervix, so that the posterior surface of the uterus is reached. This is then raised as far as possible, while the fingers of the other hand grasp and knead the uterus through the abdominal walls. Sometimes the uterus is pressed against the walls of the pelvis laterally, or against the posterior surface of the symphysis pubis.

According to those who practise this form of gynæcological treatment, there are scarcely any pelvic affections for which it is not useful and which it does not cure. Graham says that the two essentials for a pelvic masseur are that he should have clean hands and a pure heart.

While I do not for a moment deny that the use of massage externally may have good effects in hyperæmia of the ovaries and uterus, and while I believe in this way such affections as dysmenorrhœa and amenorrhœa may be temporarily modified, yet I confess it would require a very great deal of persuasion and a great deal more proof of its benefits and its superiority to other methods to warrant me in advising, far less practising, a manipulation which, on the face of it, ought to be repellant to every right-minded woman. It is said that it is better to endeavour to cure displacements by this method than by the use of pessaries, because, forsooth, the use of these passive little instruments are apt to concentrate

a woman's mind too much on her genital organs; but might I venture to inquire which is more likely to concentrate a woman's mind upon this part of her organisation—a pessary whose presence, if not unknown, is at least unfelt, or the regular friction of her vagina and uterus for weeks or months with the fingers? The question, it seems to me, requires no answer.

But another obvious objection, if such be necessary, is that it is by no means free from danger, because in endeavouring to remove a chronic deposit in the pelvis or enlargement of the ovary, there is considerable risk of setting up either acute inflammation or producing an hæmatocele or hæmatoma. But further, it has been recommended for the cure of pyosalpinx by kneading the pus along the tube into the uterus. Any one who has worked with the uterine annexa knows perfectly well that in cases of purulent tubal distention the uterine end of the tube is, in the great majority of cases, impermeable, and that massage is therefore not only useless but dangerous, inasmuch as the tube may rupture in the process, with most disastrous results.

I, for one, cannot sanction internal pelvic massage, not only because it is obviously a very undesirable and indelicate manipulation in itself, but because it has not been shown to have the slightest advantage over any of the ordinarily recognised methods of treating gynæcological disease, and is by no means free from danger.

In what I have just said I refer entirely to internal massage, whether rectal or vaginal, for from external massage of the abdomen and rest, combined with other adjuncts, such as hot irrigation, I have seen the very best effects.

I fear, sir, that in selecting me to open this discussion you have failed to secure a very enthusiastic admirer of the method, and, what is still worse, one who has had comparatively little success with it, especially in his own department of medicine. All I can say is, that I have endeavoured to put the matter before you as shortly as my time will permit, and, so far as my work is concerned, I have only stated the facts as they stand.

Dr A. J. Keiller then read the following paper:—

The employment of massage as a means of curing or alleviating abnormal conditions of the human body is by no means a thing of yesterday, as from authentic historical records we know that rubbing (certainly not a perfect form of the treatment) was practised systematically by Hippocrates himself about 380 B.C., who then laid down certain principles which to-day hold good, viz.:—

1*st*, Soft or light rubbing loosens or relaxes tissue.

2*nd*, Hard or vigorous rubbing binds or contracts tissue.

3*rd*, Prolonged rubbing causes tissue waste.

4*th*, Moderate rubbing causes tissue growth.

And although perfectly ignorant of the anatomy of the circulation,

he remarked that in the limbs rubbing upwards had a better effect than rubbing downwards.

It is also related by Plutarch, in the time of the Roman Empire, that the Emperor Cæsar Augustus was cured of a general neuralgia by being manipulated daily by a slave.

Since then, all through the ages, it has been consistently practised by the peoples of Eastern countries, more particularly in China, where passive muscular exercises have for centuries been employed not only for the development of the healthy body, but also as a curative agent.

The following extract from Capt. Cook's diary, dated from Society Islands, Sept. 22nd, 1777, is of interest:—

"I now returned on board my ship, attended by Otoo's mother, his three sisters, and eight more women. At first I thought this numerous train of females came into my boat with no other intention than to get a passage to Mataria; but when we arrived at the ship, they told me that they intended to pass the night on board for the express purpose of undertaking the cure of a disorder I had been complaining of, which was a pain of a rheumatic kind. I accepted the friendly offer, had a bed spread for them on the cabin floor, and submitted myself to their treatment. They began to squeeze me with both hands from head to foot, but particularly in the parts where the pain was lodged, till they made my bones crack and my flesh become a perfect mummy. In short, after undergoing this discipline for about a quarter of an hour, I was glad to get away from them. However, the operation gave me immediate relief, which encouraged me to try another rubbing down before I went to bed, and it was so effectual that I found myself pretty easy all the night after. My female physicians repeated their prescription next morning before they went on shore, and again in the evening when they returned on board, after which I found the pains entirely removed; and the cure being perfect, they took their leave of me the following morning.

"This operation is universally practised amongst these islanders, sometimes performed by the men, but more generally by the women."

The modern school of massage in this country may be said to have been instituted by Mr Grosvenor, Professor of Surgery at Oxford, in the year 1825, who employed it to a great extent in the treatment of stiff, chronically swollen and contracted joints associated with a languid state of the circulation, thickening of the ligaments, and over-secretion of the synovial fluid; in cases of fracture where stiffness persisted after union; in cases of dislocation where impairment of motion persisted some time after reduction.

And now, I think, we have arrived at a time in the history of this method of treatment when everything points to its recognition by the physician and surgeon alike as a very useful and powerful additional means at his disposal for effectively dealing

with many otherwise intractable diseases. It, of course, like many other methods of treatment, can be abused; but when properly applied, and employed in suitable cases, its effects are wonderful, and entirely satisfactory.

Massage belongs to the class of movements known as "passive," that is to say, the muscles are exercised without any effort of the will or central nervous aid of the person who is being operated on; and, as Dr Weir Mitchell remarks in one of his treatises, "The alternate grasp and relaxation of the manipulator's hands squeezes out the blood and allows it to flow back anew, thus healthfully exciting the vessels and mechanically increasing the flow of blood to the tissues which they feed." This bodily exercise increases the physical powers, giving more strength to resist sickness. It does for the body what intellectual training does for the mind—educates and strengthens it.

The effects produced by massage may, I think, be conveniently classified as—1*st*, Circulatory; 2*nd*, Nervous; 3*rd*, Moral.

1*st*, CIRCULATORY.—All muscular movements of the body, aided by respiration and the valves of the veins, assist the return of the venous blood to the right heart, these several forces constituting what is called the *vis à fronte;* but apart from this indirect effect on the circulation produced by passive muscular movements, we have also in massage a direct mechanical pressure effect produced by the manipulations, all being made in the line of the venous and lymphatic currents, viz.:—

In Head and Neck.—From vertex over frontal, temporal, and occipital regions to root of neck above clavicles.

In Upper Extremities.—From tips of fingers to axilla.

In Lower Extremities.—From tips of toes to groins.

In Chest and Abdomen.—From centre line to circumference of front of trunk.

In Back.—From spinal column to circumference of back of trunk.

As examples of this class of effects, I may mention *effleurage* or stroking, and *pétrissage* or kneading.

In Effleurage the stroking movement is made with pressure varying from the very lightest touch to that of considerable pressure, the results of which are—1*st*, direct stimulation of the cutaneous circulation, which is evidenced by the reddening of the surface of the skin; 2*nd*, increased lymphatic absorption, so that if exudations are present their resorption is hastened; and, 3*rd*, increased interchange of capillary contents and tissue, which necessarily means improved nutrition or metabolism. Experiments have been made to demonstrate and prove that this lymphatic absorption is a well-marked effect of massage, by injecting both knee-joints of a rabbit with Indian ink. Afterwards one of the joints was massed several times in the day, the other being left alone; and on examining the joints, after killing the animal, the massed joint was found practically normal, and the lymphatics

leading from the joint of that side discoloured, showing that lymphatic absorption had taken place, whereas the unmassed joint was found filled and blocked up with discoloured matter and a large amount of fluid.

In Pétrissage the muscles are seized between the whole length of the thumb and fingers, and a combined squeezing, rolling, and twisting motion is produced, which has the effect of alternately forcing out a volume of blood from the particular muscle which is being manipulated, as well as assisting the lymph onflow, and during the relaxations letting it fill again, thus mechanically reproducing one effect of exercise. We know that in ordinary muscular contractions the blood is driven from the deep into the superficial vessels, and this suggests the possibility of relieving deep-seated congestions, either of tissues or organs, by manipulations applied to the surface of the body, and systematic passive movements of the joints,—in fact, the production of a form of counter-irritation.

2nd, NERVOUS.—These effects are to a certain extent secondary to the circulatory, as it is by increasing the quantity and improving the quality of the blood-supply to the nervous centres and nerves that their functional activity is correspondingly exalted. But in such manipulations as *Tapotement*, or hacking, and the various forms of vibrations, we have a means of directly influencing the nerves themselves, very much like the effect produced by stimulation with the Faradic electric current. There cannot be the slightest doubt that many nervous conditions are due to an abnormal arrangement of the molecular structure of the nerve tissue; and I think it highly probable that by means of these vibratory movements a normal condition of these nerve elements can be established in much the same way as in the surgical proceeding of nerve-stretching. For example, take a case of neuralgia. Here, as far as we know, the pain present is due to pressure on the sensory fibres of the affected nerve, due to some cause producing this abnormal molecular arrangement, or may be also to pressure produced by inflammatory adhesion, or fluid pressure, or pressure from abnormal growths. In such cases the results by vibration directly applied to the seat of pain are entirely satisfactory. Again, by direct stimulation of the central nervous system (posterior spinal nerve-roots), we can act on the sympathetic, which means that we have at our command a very powerful means of influencing the circulatory and secretory apparatus of the whole body.

3rd, MORAL.—The mind necessarily participates in all forms of exercise, for with all physical effort we have a concomitant intellectual act, this bringing about a harmonious action of body and mind, leading to a more perfect combination and regulation of movement. In this connexion also the confidence which we seek to inspire in our patients must have a very powerful moral effect,

and this goes very far in all forms of treatment to carry a case to a successful termination.

The dieting of a patient undergoing massage treatment is of the greatest importance. I think the old idea of over-feeding in every case is not a sound one, for just as cases have clinical features and constitutional characteristics peculiar to themselves, so both the treatment and diet must be varied, according to the different temperaments and constitutions with which we have to deal. The bodily requirements for food differ within very wide limits,—that is to say, what would be considered good feeding by one is thought low feeding by another; and, as far as I can judge, much better results are obtained by adopting a middle course in this matter; and, as in the manual part of the treatment, a method of a gradual increase and as gradual a decrease of manipulations and surplus feeding, in some cases even an entire cessation of the former, should be the best plan, so as to accustom the various organs, secretions, and tissues to their new physiological conditions.

Before giving some cases illustrative of the treatment, I should just like to briefly tabulate the conditions in which massage will be found of great service in both medical and surgical practice.

(1.) MEDICAL.—Anæmia, general debility, neurasthenia, hysteria, neuralgia, muscular rheumatism. In these it is beneficial by producing more rapid circulation of blood and lymph, increasing metabolism, and removing waste products.

Paralysis.—More especially when associated with muscular atrophy. For these cases benefit is derived from direct nervous stimulation, which has an effect not only on voluntary but on involuntary muscular fibre, and can therefore be also used in such conditions as atony of stomach, atony of bladder, chronic constipation, etc.

Congestions of Internal Organs.—Stomach, liver, kidneys, spleen, uterus. In these it acts as a form of counter-irritation, drawing the blood from the deeper to the more superficial parts, and also through sympathetic stimulation, inhibiting the blood-supply and increasing glandular secretion and lymphatic absorption.

(2.) SURGICAL.—Sprains, dislocations, fractures, chronic joint affections, associated with œdema and stiffness, and without constitutional taint or presence of pus. In these it promotes absorption and breaks down adhesions.

Dr J. H. A. Laing advised that massage, when used in the treatment of constipation, should be combined with passive and active exercises of the abdominal muscles. Many forms of dyspepsia might be benefited by the same treatment. With regard to the Weir Mitchell treatment, it was often followed too closely. It required to be modified to suit individual cases. In many

gynæcological cases abdominal massage (leaving alone the internal part), combined with exercises of the abdominal muscles, did much to improve the circulation about the pelvis, and often resulted in great benefit. It was very important that such exercises should always be given short of fatigue. Many cases of weakness after serious illness might also be assisted by massage and passive exercises. Massage was not sufficiently used for sprains and strains. It was usually thought in this country that a patient with an average sprain of the ankle should be laid on his back for six weeks. By the use of massage he commonly had such cases walking in a fortnight. The treatment should be begun on the day after the accident, and always at first above the injured part, which should not be touched until some of the effusion had gone. The first treatment might last an hour and a half. It should not be painful, but always soothing. After massaging, a bandage should be applied. By the second or third day passive movements should be made in all the correct directions, except that in which the strain had occurred. Next, the circulatory movements should be made. By the end of a week, with the aid of a bandage, the patient should be able to walk a little. In cases of acute traumatic synovitis in strong persons, by the use of massage the condition could usually be cured in a week.

Dr W. Allan Jamieson then read the following paper on MASSAGE IN THE TREATMENT OF DISEASES OF THE SKIN:—For obvious reasons friction or kneading is unsuitable as a means of treatment in acute diseases of the skin, and even when the complaint affecting the integument has become chronic, has assumed an inactive or indolent phase, such manipulations, however gently practised, are liable to induce a recurrence or to light up afresh inflammatory phenomena. Hence the obstinate infiltration in chronic eczema is seldom adapted for dispersion by massage, and the solid lymphatic œdema of elephantiasis, or that left behind by repeated attacks of erysipelas, or occasionally by lupus of the limbs, is hardly suitable to be dealt with by such methods. But there are two conditions in which massage is advantageous. One of these is during the *early stage of alopecia prematura*. While seborrhœa is often the cause of that dystrophia capillitii ending in irremediable baldness, there is frequently associated with the progressive loss of hair a shrinkage and fixation of the scalp, which acts destructively on the hair-bulbs by a process of compression, and by cutting off or lessening that abundant blood-supply beneath the hair roots which, like a subcutaneous marsh, feeds the hair papilla and maintains the succulence of the bulb. To postpone, if not to arrest entirely, this contraction, massage is useful. The scalp in such cases should be kneaded and moved backwards and forwards, as well as sideways, on the aponeurosis below, several times a day, for a

few minutes each time. This comes in as an adjunct to the therapeutic measures intended to cure the seborrhœa. Such manipulations have certainly proved of service in some cases, and are calculated to do much good if commenced in time and if steadily persevered in. The second condition in which massage is of use is in the rare disease known as *symmetrical diffuse scleroderma*, in that form of it in which infiltration and not atrophy is conspicuous. Here the hide-bound state of the integument is substantially benefited by prolonged soaking in warm water, combined with judicious massage. Having had the opportunity of observing for three years a case of this nature, it has been in my power to verify the continuous amelioration which occurred in consequence of this mode of treatment. The induration slowly and almost uninterruptedly melted away. Thus the entire skin of the back, at one time more like the hide of a hippopotamus than the integument of a human being, became soft and pliant. The scalp, from being tightly stretched over the cranium, acquired a considerable degree of motility, and hair again began to sprout on a surface formerly as smooth as a billiard-ball, and almost as dense to the feel. In such a case one must bear in mind, however, that there is a tendency to spontaneous improvement. Still, allowing for this, the patient, as well as myself, felt convinced that the systematic massage was an important element in procuring amendment. Massage has therefore a distinct if somewhat restricted place in dermatological therapeutics.

Mr Joseph Bell said that a serious sprain—one that might be described as being as bad as a dislocation, only the bone had got back to its place again—would not stand massage. But mild sprains ought to be treated by early massage and early movement. He even went further, and treated every case of Colles' fracture in which he had the opportunity without splints and with massage. This treatment, however, could only be adopted with patients who could be thoroughly trusted, and it was necessary to see them every day for a time. There was a form of joint disease with effusion occasionally seen in delicate young men or women, usually in the hips or ankle, which looked as if it was going to be a white swelling, but was not. It was generally attended with, and caused by, weakness of the muscles of the thigh. The tendons crossing the joint did not seem to keep it together, as it were, and it seemed to have an opportunity to fill. Treatment by rest and blistering did no good in these cases, but they were wonderfully improved by massage of the muscles of the leg and thigh. In using the Weir Mitchell treatment for neurasthenic cases, the one essential was to get a really good nurse. Success depended more upon the personal equation of the nurse than upon anything else.

Prof. Chiene said that massage, or rubbing, was an important

matter in practical surgery. He wished to make some remarks about its use, with special reference to the motor system. It was of value, firstly, as a means of relieving pain. For this purpose it required to be gentle, and upon the nerve terminations. Secondly, it was of value for the prevention of adhesions, in which case it required to be of a firmer character. Thirdly, it was of importance as a means of breaking down adhesions. He frequently saw cases in which firm adhesions had been allowed to form in joints after sprains. It was necessary to break them down. This could be done in two ways. The first way was, after having discovered the seat of an adhesion, which was generally indicated by a painful point, to relax the part so as to get a run, as it were, and then suddenly and forcibly to extend. The second way in which one could break down such adhesions was by a kind of massage, which consisted in a firm rotatory movement with the thumb, by which means it was possible to act on the deeper structures through the skin. It was wonderful how adhesions could be broken down and pain relieved in this way. He was glad to hear what Dr Bell had said about rubbing in fractures. It had been his practice to recommend in similar cases rubbing after the first week, but he believed in the use of splints in the intervals. In traumatic effusions rubbing was certainly of the greatest value. It should be begun—when in the knee-joint, for example—on the proximal side, and not from the toes upwards. When should they begin to rub a sprain to prevent effusion? Dr Laing said the day after. He wondered why he had not said the *same* day. That was where the bone-setters were getting the better of them. The earlier they began rubbing a sprain the better; but just as in fractures, he believed in intervals of rest with the application of some form of splint. He was coming round to the belief that they would have fewer tubercular joints if they were not afraid to rub them in the early stage. He thought that rubbing, by increasing the vascularity and encouraging free leucocytosis, would result in a more active phagocytosis in the part and destruction of the tubercle bacilli.

Dr P. A. Young gave an account of a typical case of neurasthenia successfully treated by the Weir Mitchell system. He had also a case of persistent vomiting, lasting many years, which had become thoroughly well under the same treatment after other plans had failed. Massage was also of great value for old people who suffered from weak digestion and general ill-health. He was convinced that there were many cases in which the Weir Mitchell system was a most powerful means of treatment, and indeed the only one that would do any good.

Mr C. W. Cathcart said that he had made some observations upon the effects of massage on recently amputated limbs. One effect was to quickly empty the remaining blood. In one instance

in which the muscles were still active, on massaging the limb fibrillar motions were produced in them. This seemed to show that massage, in addition to increasing the circulation through a muscle, acted in the same way as electricity, and stimulated the muscle fibres themselves. Probably mechanical stimulation would also increase metamorphosis in glands, and the activity of the tissues around inflammatory products. Regarding tubercular joints, there was undoubtedly a great contrast between the effects of movement upon them and upon a simple sprain. He believed that the tubercular condition was increased if movement of the limb was allowed. He had seen benefit result from rest, and when movement was permitted again the tubercular condition got worse. He therefore would hesitate to apply massage to a tubercular joint. He had seen such cases sent in from the country, where they had been treated by bone-setters with massage, which had seemed to increase the disease. He had often seen a tubercular condition increased after scraping, owing doubtless to the planting of the tubercle bacilli on the raw surface, while formerly they had been surrounded by leucocytes. If massage was to separate the bacilli from the leucocytes, he would certainly hesitate very much before he tried it in tubercular joint disease.

Dr Sommerville, Glasgow, said that he had recently been in Sweden, and had there studied massage and medical gymnastics. There were, he thought, two reasons why they were not more successful with massage in this country. The first was that they were not sufficiently scientific in the way they went about it. It was not sufficient merely for the doctor to order massage. It was his part to prescribe the kind of manipulations, and for what time they were to be carried out. The second was that they did not combine judicious exercises with massage. In Sweden the doctor wrote a prescription of medical gymnastics for the patient to carry out.

Dr James Ritchie said that every case of neurasthenia was not benefited by massage; that massage alone was not sufficient; that the moral influence of a suitable nurse was of the utmost importance; and that whenever there was a morbid craving for sympathy, causing the patient to speak continually about her symptoms, or if the friends in any way kept her from making efforts on her own behalf, then the sooner the patient was away from her friends the better. He believed that in cases of malnutrition it was an advantage to use the inunction of oil instead of dry rubbing, as much of it was absorbed by the skin, and helped to increase the weight of the patient.

Dr James Carmichael said that he feared from the experience he had had that there was a tendency to this method of treatment

being taken up by unlettered persons, particularly by those people whom they were now in the habit of employing themselves,—the masseurs and the masseuses. He had seen more than one case in which harm had been done by patients going to one of these persons, and being treated without any scientific principle whatever. It was their duty as practitioners to see to it that they did not let massage descend into the regions of charlatanism. It was really a most valuable method of treatment, and they should endeavour to keep it on a high scientific level.

Dr Affleck gave some illustrations of cases in which he had found the practice of massage as a manipulation very serviceable. In several cases of alcoholic paralysis he had effected a cure by its use. He had found, also, that chronic muscular rheumatism was much benefited by it. Massage sometimes had an extremely soothing effect in insomnia. In cases of so-called "neurasthenia," massage was often the last resort of a baffled practitioner. In many cases it was successful, but there were also numerous failures. He agreed with what previous speakers had said as to the importance of a suitable nurse. That could not be too strongly insisted upon. There was no doubt that massage treatment was an important addition to therapeutics, but it was unfortunate that it was mostly a luxury of treatment for the rich, and was so little available for the poor. They should all try to see that it was kept within the lines of legitimate medical practice.

Dr George Hunter said that in sending neurasthenic cases for special treatment they should make sure that the case was not one of serious organic disease. He had seen one such case which turned out to be really one of bulbar paralysis.

Dr John Playfair said that in cases of real neurasthenia the treatment must be carried out thoroughly. That was how Dr Playfair of London had so many successes. There should be two nurses,—a general one, and a special massage nurse.

Mr H. J. Stiles said that when recently in Berne he had had his attention specially directed to the treatment of early tubercular disease of joints by Prof. Niehans, who assured him that he had found it very beneficial, especially in the case of those joints of which the synovial membrane could be most thoroughly got at.

The President said that massage no doubt had a relationship with the treatment of mental disease. The first two or three cases in which he had employed it, after having seen it recommended by Dr Weir Mitchell in Philadelphia, were very successful. Since then, however, his experience of massage in mental disease had been, on the whole, more unfavourable than favourable. It was most applicable in melancholia. He had tried it in many such cases, and beyond any doubt it had done good, but always

when combined with exercise, and when the patient was not confined to bed, or entirely secluded. The more the case was one of typical mental disease, the less room was there for massage. The more the case was one of trophic deficiency and neurasthenia, the more room there was for massage. Anything that would fatten a melancholic would do good, and in this way at least massage was beneficial in some cases. He had certainly seen a great number of melancholics made a great deal worse by the Weir Mitchell treatment, and especially by the seclusion. He thought they might take it that the Society thoroughly agreed with, and homologated, Dr Croom's energetic protest against the use of internal massage of the pelvis, which had been recommended in a recent French book.

Dr Halliday Croom briefly replied.

Dr Urquhart, Perth, who was unable to be present at the meeting, writes as follows:—The Weir Mitchell treatment seemed to offer peculiarly favourable results for asylum physicians. Patients could be absolutely separated, and minute attention to details could be insured. But, however careful and persevering, I regret to say that the results have not been at all satisfactory. I have, indeed, arrived at the conclusion that in the great majority of cases of actual insanity, massage aggravates delusions, and in no way removes the mental symptoms. This is very remarkable, because such cases of less severe neuroses as have been so treated have yielded most satisfactory results. If the cure has not been permanent (we call no man happy until he is dead), at all events there has been such temporary alleviation as to make life worth living for those to whom it had been a grievous burden. I venture to explain this notable difference by the results of treatment directed more towards intestinal disinfection, rest and quiet, graduated exercise, and careful dietary. The omission of massage seems to be in the patient's interest. I also hazard the theory, that in cases of melancholia occurring in the middle classes of society, such as come here late in the day, after treatment in private care, the brain cells are already too exhausted to bear the strain of even the most moderate massage. There is one notable exception to these remarks, and were it not for the importance of emphasizing it, I should not have troubled you with this communication. I refer to the results of massage of the abdomen in cases of obstinate constipation and inattention to the calls of Nature, which are most common and most intractable in our practice. It has come to be a part of our routine treatment, not in an empiric or unintelligent manner, but because it is susceptible of daily proof positive—unfailing when properly administered.

Meeting X.—June 6, 1894.

Dr CLOUSTON, *President, in the Chair.*

I. ELECTION OF MEMBERS.

The following gentlemen were elected Ordinary Members of the Society:—C. E. Douglas, M.D., Cupar, Fife; William Fraser Wright, M.B., C.M., Bonnington Mount, Ferry Road, Leith.

II. EXHIBITION OF PATIENTS.

1. *Dr James Carmichael* showed a little girl, J. B., aged 1 year and 5 months, the subject of PLEURITIS WITH PURULENT EFFUSION TREATED BY ASPIRATION. She was admitted into hospital on the 23rd October, and dismissed cured on the 24th December. The previous history showed that ten months ago she had suffered from measles, from which she apparently made a good recovery. About five weeks before admission she began to show signs of weakness and slight cough. On admission the child was pale and feeble and out of condition. The physical signs of fluid on her right side were well marked, and the exploring needle withdrew thick pus. The pleura was then aspirated, and 12 ounces of pus removed. Two days after, on the 25th inst., 3 ounces of pus were removed. The child showed a steady improvement, both as regards her general condition and the physical signs. Nothing further was done till the 30th inst., when 4 ounces of pus were removed. On November 2nd, 3 ounces of pus were removed. On November 4th, it was decided to drain the pleural sac. On incision no pus escaped; the wound was closed, and healed by first intention. On November 9th, aspiration was tried, and 2½ ounces of pus obtained. Several other explorations were subsequently made with the hypodermic needle, and no pus discovered. She made an uninterruptedly good recovery, and was dismissed December 24th, two months after admission. On 12th May she returned for inspection, and no difference on the physical signs on the two sides of the chest could be made out. In vol. i. of the *Edinburgh Hospital Reports*, out of 24 cases of purulent effusion he had recorded 5 cases as cured by aspiration. This was the largest purulent effusion he had met with cured by aspiration alone. It had always been his practice in purulent effusions to aspirate in the first instance, as thereby important information was obtained as to the nature and amount of the fluid. Two or three days after, aspiration is again performed, and if there is any great amount of fluid the pleura is drained. In this case the small amount of pus obtained at the second aspiration led him to delay drainage, with the result now detailed. As the entire amount of pus is never removed by aspiration, and there is always a certain amount of re-accumulation,

it follows that the serous cavity is able to dispose of the residual pus, a fact which is easily accounted for when the function of the large pleural lymph sac is taken into account.

2. *Dr Norman Walker* showed two cases of RODENT ULCER after operation.

3. *Mr A. G. Miller* showed three cases of EXCISION OF THE WRIST BY WATSON'S METHOD.

4. *Dr Logan Turner* showed two cases exemplifying operation for DISPLACEMENT OF THE SEMILUNAR CARTILAGE.

III. EXHIBITION OF SPECIMENS.

1. *Dr Edward Carmichael* showed an ANEURISM OF THE AORTA WITH RUPTURE INTO THE RIGHT VENTRICLE.

2. *Dr Burn Murdoch* showed a specimen of HYPERKERATOSIS OF THE FILIFORM PAPILLÆ OF THE TONGUE, and read the following notice of the case:—The patient was 41 years of age. He sought advice on May 15, 1894, on account of a sebaceous cyst below the angle of the jaw, which had existed for many years. When under treatment for this he mentioned casually that there was something peculiar on the back of his tongue. On inspecting the tongue a dark raised growth was seen far back, $\frac{5}{8}$ of an inch wide and about $1\frac{1}{2}$ long; it was about $\frac{1}{4}$ of an inch in height. It caused no pain or annoyance, and would not have been detected had the patient not accidentally seen it, about two months before the time of his visit. It was fairly hard when touched, and gave to the finger the impression of a warty growth. On May 22, 1894, the tongue was drawn far forward and inspected in a good light. The growth was seen to be composed of numerous fibres, resembling hairs and their roots. The word "hairy" at once suggested itself as most descriptive of the condition. On applying to the edge of the growth a pair of forceps some small fibres came away, still more closely resembling hairs and their roots. The whole growth was pulled away piecemeal by forceps, and the base of the part scraped with a small spoon. The structure was immediately sent to Dr Robertson for examination, to whom I am indebted for the pathological notes on the growth. I may mention that patient was an unusually heavy smoker, and was also in the habit of using red gum lozenges freely, which probably accounts for the colour mentioned in Dr Robertson's report.

An interesting account of the affection, with references to the literature on the subject, will be found in the *Monatsschrift für Ohrenheilkunde sowie für Kehlkopf-, Nasen-, Rachen-Krankheiten*, No. 28, Berlin, April 1894. In the article referred to the affection

is mentioned as apparently being more common in heavy smokers than in others.

Dr W. F. Robertson has supplied the following Pathological Report on the specimen:—The growth from the above case, which was handed to me for examination by Dr Burn Murdoch, presented the following characters:—The several pieces together weighed about thirty grains. To the naked eye they appeared to consist of slightly interlacing bundles of coarse threads of a white or brown colour. Many of these threads were fully three-quarters of an inch in length, though the majority of them were much shorter. They were surrounded by tenacious mucus and débris which had a distinctly pink tinge. Under the microscope some of the threads were seen to be made up of two or more finer filaments lying side by side. Others consisted of single filaments. There was no distinct evidence of the former appearance being due to branching. Each thread was entirely composed of extremely large thin epithelial scales. In the centre of a thread these scales were closely packed together, but at the edges they tended to be separated from each other, and had an imbricated arrangement, giving an appearance like that of the stem of a plant closely set with bracts. They stained yellow with picrocarmine, and had no nucleus. Lying between them there could be distinctly seen, isolated or in rows, clear rounded bodies about half the size of a red blood-corpuscle. These were rendered more distinct by treatment with caustic potash, and were probably fungi. The mucus surrounding the threads contained numerous epithelial scales, abundant round cells, clear rounded bodies like those seen within the threads, and much granular débris. Most of these detached epithelial scales resembled those composing the fully-developed threads, from which they had doubtless been shed, but others presented a deeply-stained nucleus in the carmine preparations, and probably were derived from near the roots of the growth, or from the normal surface of the tongue. In unstained preparations much of the granular débris was seen to be of a bright pink colour. The case was evidently an example of the rare condition to which the names "Black Hairy Tongue" and "Hyperkeratosis of the Filiform Papillæ of the Tongue" have been given. Several cases have now been described in various medical journals, chiefly on the Continent and in America, and Wallerand has written a monograph on the subject (*Contribution à l'étude de l'étiologie et de la pathogénie de la langue noir pileuse*, Paris, 1890). Ziegler, in the last edition of his *Text-book of Pathological Anatomy* (German edition, vol. ii. p. 480), gives the following account of the condition, and appends a list of the papers that have appeared bearing upon it:—"In rare cases hair or bristle-like structures develop over the filiform papillæ of the tongue by pathological growth and horny transformation of the epithelium. These assume a colour varying from brown to black, owing to diffuse staining of the cells which are undergoing horny

transformation, and thus they constitute a change which may be described as black hairy tongue (*schwarze Haarzunge*). According to investigations by Dessoir, Raynaud, Dinkler, and Brosin, there often lie in the neighbourhood of the cornified epithelial filaments abundant bacteria and filamentous fungi, though these are not the cause of the peculiar hyperkeratosis (*hyperkeratose*). The change may subsist only a short time, or may last many years." Bearing upon this point, an important paper, to which our attention has kindly been directed by Dr M'Bride, appeared in the *Monats. f. Ohrenheilk. sow. f. Kehlk.-, Nas.-, Rachen-Krankh.* for April last, by Sendziak ("Beitrag zur Aetiologie der sogen. schwarzen Zunge"). He made a bacteriological examination of two cases, and succeeded in growing from both, on bread paste, a special fungus. This organism was identical with that of which cultivations were obtained shortly before by two Polish observers (Ciaglinski and Hewelke) from a similar case, and which was regarded by them as being the *mucor niger*. All of these observers maintain that the condition is due to the presence of this fungus. Sendziak appears to hold the opinion that black tongue, unaccompanied by any hypertrophy of the papillæ, is really the same disease, and that the hair-like growth is a secondary and non-essential accompaniment. If this view is correct, the disease must be less rare than has been supposed.

3. *Dr W. Allan Jamieson* showed a SOAP OF RESORCIN AND SALICYLIC ACID.

IV. Demonstration.

Dr Alexander Bruce gave a Lantern Demonstration on preparations from a case of SYRINGOMYELIA.

Dr Byrom Bramwell showed with the lantern some MICROSCOPIC SPECIMENS from a similar case. From top to bottom in the centre of the cord there were large masses of gliomatous tissue. They broke down in the process of hardening, so as to form a cavity. He also showed microscopic preparations of spinal cords from two ordinary cases of myelitis presenting small cavities surrounded by a membrane. It had been denied that these were formed in any case of myelitis, but he held that the specimens he showed demonstrated that the excavating myelitis of French writers did occur.

V. Original Communications.

1. *Dr A. Logan Turner* read his paper on DISPLACEMENTS OF THE SEMILUNAR CARTILAGES OF THE KNEE JOINT,[1] of which the following is an abstract:—

[1] The paper was illustrated by a series of lantern slides made from photographs of dissected knee joints to demonstrate certain points in the anatomy and mechanism of the joint. A number of semilunar cartilages which had been removed from the knees of patients were shown in the same way.

Dr Turner proceeded to point out what he considered were the reasons for the more frequent displacement of the internal semilunar cartilage.

1*st.* The greater fixation of this cartilage, as evidenced by the greater separation of its terminal points of attachment, the short, firm coronary ligaments throughout the whole extent of its convex margin, and a strong fibrous union with the internal lateral ligament of the joint. The external semilunar cartilage was more movable from the closer approximation of its terminal points of attachments, from a separation of a portion of its convex margin from the capsule by the tendon of the popliteus muscle, and being anteriorly more in the centre of the joint, union with the capsule is here also looser, and from the absence of any firm union with the external lateral ligament of the joint.

He further demonstrated the use of the transverse ligament of the joint as an additional means of attachment of the external semilunar cartilage, because in rotation inwards of the leg at the knee, during which movement this cartilage had a tendency to slip backwards and inwards, that ligament was rendered tense, and thus acted as a restraining force, while in external rotation, when the internal semilunar cartilage tended to slip, it was slack. This ligament varies in its development and exact attachments, and is frequently absent.

The greater the fixation of the semilunar cartilage the greater the liability to its attachment being strained in the movements of rotation at the knee, and, consequently, the greater the tendency to stretching or actual tearing of them.

2*nd.* External rotation of the leg at the knee joint can be carried out to a greater extent than inward rotation; consequently the attachments of the internal semilunar cartilage can be subjected to a greater strain than those of the external. These movements can only be produced in flexion of the joint. The internal lateral ligament checks further external rotation, the anterior crucial ligament checks internal rotation.

3*rd.* The ordinary position of the leg in walking and running lends itself to the production of more frequent strain upon the coronary ligaments of the internal semilunar cartilage, because the position is one in which the toes and foot are naturally turned somewhat outwards, so that any force applied to these parts will be more readily received upon the inner aspect of the foot, so that a sudden and forcible rotation outwards of the tibia at the knee might take place.

Dr Turner then went on to explain how a knee joint might become "predisposed" to such a lesion in certain occupations which entailed much kneeling. Out of 29 cases which had been operated upon by Prof. Annandale, and upon an examination of which the writer based his remarks, 13 were miners, 1 a gardener, and 1 a domestic servant. The occupation in all these required

a considerable amount of prolonged and varying flexion of the knee. In flexion of the joint, the semilunar cartilages glide backwards upon the head of the tibia, and during this movement the anterior part of their coronary attachments are put on the stretch, and thus may become weakened. Statistics show that these cartilages are most frequently displaced anteriorly.

In this series of 29 cases, 24 were those in which the internal semilunar was displaced, in 2 the external; in 3 the cartilage was not specified.

The displacements might be divided into two groups: 1*st*. Where there is abnormal mobility of the cartilage from relaxation or stretching of its coronary attachments. 2*nd*. Where there is actual detachment of the cartilage in whole or in part, from complete or partial tearing of its coronary ligaments.

The symptoms and diagnosis of those old-standing cases, in which more or less frequent recurrence of the displacement took place, were then described. Some stress was laid upon the necessity of getting the history of an initial injury, as an aid in diagnosis. Locking of the joint was an important symptom, though not always occurring in cases of displaced semilunar cartilage. It might be a symptom of loose body, hypertrophied infra-patellar pad of fat, pedunculated body from synovial membrane or tumour, if situated where wedging of these between the articular surfaces of the bones could take place.

If the patient stated that he saw or felt something coming out of the joint, this body always appeared at the same spot in the case of the displaced semilunar cartilage, as contrasted with the loose body which appeared at different parts of the joint.

The seat of the pain described by the patient, as also elicited by the surgeon on pressure, must be located to the interval between the femur and tibia on the inner or outer side of the joint as the case might be, and not upon the bones themselves, thus differentiating between displaced cartilage and periostitis and ostitis of these bones from some cause.

The treatment carried out in these 29 cases had been either that of stitching the displaced meniscus into position, or of its removal, the latter having been most frequently employed, viz., in 21 cases, the remaining 8 having been stitched.

Highly satisfactory results were obtained by both methods of treatment. In all save one, a most useful joint resulted. Letters were read from patients whose semilunar cartilages had been stitched or removed at different periods during the last ten years, indicating no recurrence of the previous symptoms, absence of pain, stiffness and locking, and in all a return to their former occupation, and in one or two football and cycling had been resumed.

Mr Joseph Bell said that they might well congratulate themselves on having such an admirable paper brought before them,

and also Mr Annandale in having the magnificent work he had done brought so carefully and well before the Society. Mr Annandale had taken an absolutely first place in the whole subject of interarticular knee joint disease, and his work had reflected great honour upon the Edinburgh School of Medicine. He also congratulated Sir William Turner, for he might well be proud of what he had seen done that day. He wished just to make one *caveat* regarding Dr Turner's paper. The operation described was not entirely devoid of danger, and he did not want every practitioner to think that it was necessary to open into every knee joint that had a loose body in it without counting the cost.

Prof. Annandale said that he need scarcely state that he had listened to Dr Turner's paper with peculiar pleasure, and also some feeling of pride. It had been a great encouragement to him to offer clinical material to his younger friends, because it was an example of how such material might be worked out. He had first been led to the subject entirely from a clinical point of view. He had not troubled himself much about the causes of these displacements nor the special anatomy of the knee joint, but he had found from clinical experience that the semilunar cartilages, and especially the internal one, got displaced, and that such displacements were not relieved by bandaging. In the first case he operated upon he found the internal cartilage separated from its attachments, and doubled up. He stitched it in position, and the result was so satisfactory that it naturally led him to persevere. He agreed with Mr Bell in the word of caution which he had given. There must be some risk in the operation. He, however, recommended it only in cases in which all other methods of treatment had failed, and in which the condition was really giving rise to such trouble that it made the patient's life a worry, or prevented a working man carrying on his occupation. No form of apparatus would relieve the symptoms produced by a loose internal semilunar cartilage which was displaced inwards. The only real treatment in such a case was operation. In a certain number of cases there was a difficulty in making an exact diagnosis. There were many conditions which simulated displaced internal semilunar cartilage, such as growths from the synovial membrane, tumours, and collections of fat in the joints. In such cases it was sometimes absolutely necessary to cut into the joint in order to find out what was really wrong.

Sir William Turner remarked that he need scarcely say that the way in which the Society had received his son's paper had given him very great pleasure. He had been particularly impressed with the admirable way in which the lantern served for the purposes of anatomical demonstration, not merely for bringing out microscopical appearances, but for displaying the larger and coarser relations of structure. Dr Scott Lang's paper on this subject had been referred to. He had a vivid recollection of

reading that extremely able thesis many years ago, and of the admirably philosophic way in which the structure, movements, and relations of the knee joint and its cartilages were there entered into.

Mr J. M. Cotterill said he wished to add a word of thanks to Dr Turner for his paper. He well knew how much pains had been taken over it. He had a special reason for being interested in the subject, for he had once dislocated his semilunar cartilage himself. He did not have an operation done, but by dint of lying up for eight or nine weeks had got firm union. He was interested, again, because he was in a sense the occasion of Dr Scott Lang's thesis. In 1877 he happened to go into Stamford Infirmary, where Dr Newman directed his attention to a case of displaced semilunar cartilage, and showed him how to reduce it. After coming back to Edinburgh he went to the dissecting-rooms and tried to make out how the various dislocations of the internal and external cartilages were reduced by the now well-known movements. It was only after that time that these were taught in the Edinburgh School. Shortly afterwards Dr Scott Lang dislocated his internal semilunar cartilage while playing football. Mr Cotterill reduced the cartilage to its proper position, and Dr Scott Lang was very much struck with the immediate cessation of the pain. It was after this that Dr Scott Lang set himself to the elucidation of the subject. Dr Turner had referred to the infra-synovial pad of fat. In one case upon which he had operated on account of symptoms of displacement of the internal semilunar cartilage, he found nothing wrong with the cartilage, but the synovial pad of fat was very much thickened by old inflammatory mischief. He removed it, and the patient recovered. He agreed with Dr Turner in saying that in the large majority of cases removal was more satisfactory than stitching, because the after-treatment was less tedious, and the result was more certain.

Dr Turner, in replying, said he quite agreed with Mr Bell regarding the care one should take in operating. Why he had spoken in such easy terms of the operation was because he was merely giving the results of a series of cases which had, on the whole, been most successful. He did not refer to palliative treatment at all, because he had had no experience of it. He would have liked Mr Cotterill to have told them something about the question of injury. He believed that his semilunar cartilage was dislocated without any evident injury.

The President said he had to convey the sense of the Society's obligation to Dr Turner for his paper, and to express the congratulations, which were universal. They must all have noticed the extreme lucidity with which the paper was expressed.

2. ON DR HERON WATSON'S METHOD OF EXCISING THE WRIST JOINT.

By A. G. Miller, M.D., F.R.C.S. Ed., Lecturer on Clinical Surgery, Edinburgh School of Medicine, and Surgeon to the Edinburgh Royal Infirmary.

It is always an advantage, I think, to excise a joint by one incision, provided it gives good access to the parts to be removed, and efficient drainage afterwards. Hitherto the wrist has been rather an exception to the rule of single incisions, Lister's method by two incisions being the favourite operation. In 1870 the late Dr J. D. Gillespie published an account of a case in which he had excised the wrist by a single dorsal incision. This method is frequently called Langenbeck's, but I have often heard Dr Gillespie say that his case was the first operated on.

Some years ago Dr Heron Watson explained to me how the wrist joint could be completely and easily excised by a single incision similar to Lister's ulnar one. The procedure is as follows:—The knife is entered about 1½ inch above the styloid process of the ulna towards the palmar aspect, and carried down to the metatarsal bone of the little finger, and a short distance along it. An incision of about 3 inches in length is thus made down to the bone. The lower end of the ulna is then cleared, and fully an inch of it removed. The carpus is then exposed and removed piece by piece, the trapezium only being left. The heads of the metatarsal bones can then be dealt with by gouge or saw, being turned out of the wound if necessary. Next, the end of the radius is turned out, which can be quite easily done, and sawn off. Last of all the trapezium is examined, and removed if necessary. Each step in the operation is very easy and very satisfactory. After removal of the necessary amount of diseased bone, very few vessels require to be ligatured. Sometimes one at the radial side of the wound is rather difficult to secure; but as the wound can be turned almost inside out by shoving the thumb in like the finger of a glove, no great difficulty should really be experienced.

The after-dressing that I would advise from my present knowledge and experience is packing with iodoform gauze, which should be diminished in amount at each dressing. The hand and forearm should, of course, be kept at rest on a splint. Passive movement should be commenced not later than a week after the operation. The joints that are most likely to be stiff are the metacarpo-phalangeal, but these are generally very rigid before the operation is performed. They should be freely flexed and extended as a preliminary step to the operation, as advised by Sir Joseph Lister. During the last six years I have excised the wrist by Dr Watson's method ten times, with the following results:—

In one case subsequent amputation was necessary; in one case amputation was advised, but not submitted to; in three more cases

disease returned, necessitating scraping; while in the remaining half of the cases the disease did not return, and a useful hand was obtained. In the three cases that were scraped—one of them twice —a fairly useful hand is the result.

A glance at the Table will show an interesting fact, viz., that in eight out of the ten cases the right hand was the one diseased. Does not this point to trauma as the exciting cause?

No.	Name.	Sex.	Age.	Hand.	Date of Operation.	Healed or Discharged.	Result.
1	M. C.	F.	19	R.	5th Mar. 1889	5th Dec. 1889	Return of disease; amputation advised.
2	J. W.	F.	19	R.	3rd Jan. 1890	5th Feb. 1890	Useful hand; able to work in mill; ganglion on back of wrist, probably tubercular.[1]
3	J. M.	M.	30	R.	23rd June 1890	20th Sept. 1890	Fairly useful hand; seen last some months after leaving hospital.
4	Mrs F.	F.	69	L.	14th July 1890	27th Aug. 1890	Fairly useful hand; atrophy of radius and ulna.[1]
5	J. M.	M.	11	L.	20th Jan. 1891	17th Mar. 1891	Return of disease; scraped twice; hand fairly useful; seen June 1894.
6	Mrs F.	F.	30	R.	8th May 1891	29th June 1891	Fairly useful hand; atrophy of radius and ulna; seen June 1894.
7	J. M.	M.	12	R.	2nd June 1891	4th July 1891	Useful hand; seen last some months after leaving hospital.
8	J. B.	M.	48	R.	18th Feb. 1893	11th April 1893	Fairly useful hand; operation for septic disease.[1]
9	H. M.	F.	14	R.	24th Feb. 1893	...	Return of disease; amputation.
10	R. M.	M.	21	R.	30th Dec. 1893	10th Feb. 1894	Return of disease; scraped; hand fairly useful; seen June 1894.

The advantages of this method are:—

1. Only one incision is necessary.

2. Drainage is very efficient, the wound being on the side of the hand which is the lower in the position in which the hand is usually carried.

3. The resulting cicatrix is hardly visible, and therefore the appearance of the hand is fairly natural after recovery.

4. The operation is very easy of performance.

[1] Patients shown at beginning of Meeting.

Meeting XI.—July 4, 1894.

Dr CLOUSTON, *President, in the Chair.*

I. ELECTION OF MEMBER.

Douglas Watson, M.B., 8 Brougham Place, was elected an Ordinary Member of the Society.

II. EXHIBITION OF PATIENTS.

1. *Mr A. G. Miller* showed a case of recovery after operation for SEPTIC SINUS PHLEBITIS OF THE LATERAL SINUS, the result of middle-ear disease. In operating, Mr Miller had gouged the mastoid cells, widened the external meatus, opened the mastoid antrum and the lateral sinus groove for an inch and a half, incised the sinus, and ligatured the internal jugular. A tubular stilette was used for draining the middle ear and preventing stenosis after the operation.

2. *Dr W. Allan Jamieson* exhibited—(*a.*) A CASE OF LICHEN PILARIS, *var.* SPINULOSUS.—The patient was a healthy boy of six, whose family history presented nothing remarkable. He was sent to Dr Jamieson by Dr John Thomson. Three months since, the eruption now visible appeared on the right side of the nape of the neck, then on the left, gradually extending till the patches coalesced. Some weeks later it showed itself on the front of each thigh, and has crept round to the corresponding flank. There are also two small patches under each knee, on the upper part of the shin. The eruption does not cause pain or itch. It consists of closely set, acuminate papules, greyish in tint themselves, though from a slight concurrent congestion the patch, viewed at a little distance, has a pinkish hue. Most of the papules have a minute epidermic spine projecting from their apex, hence the term spinulosus. To the hand passed over them they feel harsh and bristly. Though all the affected parts are similar, the characters are most marked on the neck. The cause of this rare condition has not, so far, been discovered. It is an affection of the hair system, is met with chiefly, but not exclusively, in childhood. The symmetry of its distribution would rather point to a trophic disturbance than to a parasitic origin. The treatment consists in washing with the resorcin salicylic soap, but cure has been obtained in other instances by the application of Vlemingkx's solution.

(*b.*) A CASE OF LUPUS VULGARIS ERYTHEMATOIDES OF LELOIR.—In this form of lupus vulgaris the localisation and the characters of lupus erythematosus are pretty closely simulated. In the case of the middle-aged woman shown, the disease extends symmetrically over both cheeks, including the nose, imparting at a little distance the bat's-wing aspect; but on closer examination the brownish-red nodules of lupus can be clearly seen embedded in the general

redness. It is fair to state that the appearances have undergone considerable modification by treatment. When admitted into the Royal Infirmary there was much crusting and pretty deep ulceration; this has all disappeared, but there are yet many isolated, and some grouped nodules. Thyroid tabloids were twice prescribed, but even three daily caused in a short time so much increase in the pulse, palpitation, and uneasiness, that their further employment had to be discontinued. She has been more than three months under treatment, and now returns home for a time, improved but not cured.

3. *Mr Cathcart* showed two successful cases of REMOVAL OF THE VERMIFORM APPENDIX FOR ACUTE APPENDICITIS.

4. *Prof. Chiene* showed a case of UNILATERAL ENLARGEMENT OF THE BONES OF THE FACE AND ANTERIOR CRANIUM in a male patient, 24 years of age, healthy and able-bodied, who was sent to the Hospital by Dr Welsh of Kinghorn. Dr Welsh believes that the condition was a sequela of severe enteric fever, when he was nine years old. The man himself thinks it began with a blow when he was nine years old, and he points to the superior maxillary bone over the antrum as the place where he first noticed the enlargement. The superior maxillary, the nasal, malar, frontal, and anterior part of the parietal bones are affected. The condition is one of general enlargement or hypertrophy.

Measurements (in inches).

	Right (normal side).	Left (abnormal side).
Circumference,	10½	11½
Glabella to external angular process,	2¼	3
External angular process to upper border of meatus auditorius,	2½	3
From upper border of meatus auditorius to external occipital protuberance,	5	6
From external occipital protuberance to tip of mastoid process,	4½	5
Ramus of jaw, posterior border,	3	3¼
From angle of jaw to symphysis menti,	4¼	5
From angle of jaw to glabella,	5½	6¾
From external angular process to mid point (between glabella and occipital protuberance),	7	7½
From upper border of auditory meatus to mid point,	6½	6½

The temporal artery is distinctly larger and more tortuous than on the opposite side. There is no difference in the skin.

Mr Jonathan Hutchinson possesses a skull evidently of one who suffered from this condition, and spoke of it when he delivered the Address to the Royal Medical Society in 1890 (*Hutchinson's Archives*, vol. i. p. 312). Mr Alexis Thomson read a paper before this Society in 1890 on a skull given to him by his brother (*Edin. Med. Journal*, January 1891). He has kindly brought the photographs here to-night. I am not aware of a similar described case in the adult in life. The skull presented to the Anatomical Museum by Mr Alexis Thomson, and the skull in Mr Jonathan Hutchinson's possession, are examples of the hypertrophy. It appears to be a localised hypertrophy of the bones supplied by the fifth nerve. Looking to the supposed relations of the pituitary body to acromegaly, one is inclined to theorise; and if the condition can be looked upon as a localised acromegaly, to ask that if in similar cases an opportunity is afforded, careful attention be directed to the pituitary body.

The patient was sent to hospital because he has recently suffered from pains over the antrum of Highmore. These were completely relieved by the administration of 10-grain doses of potass. iodid. He is a strong, healthy man, and has now gone back to work. A cast of his head has been taken, and is now in the Surgical Museum in the University of Edinburgh. Much has yet to be done in settling the nervous supply of the different cranial bones. In this connexion Prof. Chiene drew attention to a paper by Dr Murchison describing the skull of a patient of Dr Bickersteth's (*Path. Soc., London, Transactions*, vol. xvii., 1886). The condition in that case was bilateral and more tuberous than the case now recorded. The great point of interest was the complete absence of any hypertrophy in the occipital bone.

5. *Dr Byrom Bramwell* showed—(1), two cases of LUPUS under treatment with THYROID EXTRACT; (2), three cases of PSEUDO-HYPERTROPHIC PARALYSIS.

III. Exhibition of Specimens.

1. *Dr Burn-Murdoch* showed a CAST OF THE SKULL OF KING ROBERT THE BRUCE, found at Canaan Lodge, the residence of the late Dr Gregory, and presented through him to the Anatomical Museum of the Edinburgh University by Mrs Leith, Dr Gregory's grand-niece.

2. *Mr Joseph Bell* showed for *Dr Benjamin Bell*, Kirkwall, TWO CARTRIDGES REMOVED FROM A BOY.—On July 6th, 1893, Dr Bell was called to J. C., a little boy, aged eight years. Found he had sustained a gun-shot wound, which had blown away the whole of the

alveolar portion of the right superior maxillary bone posterior to the canine tooth, also making a large triangular gaping wound in the centre of the cheek. In the soft tissues of the cheek was found and removed a fired-off blank cartridge. The cornea and sclerotic coats of the right eye, along with the skin of the face, were impregnated with portions of gunpowder.

Statement of the accident by his brother, H. C., aged fourteen, who shot him:—H. C. stated that he picked up on the volunteer ground a blank unfired cartridge. When he returned home, he took down an old breech-loading gun, and inserted the blank cartridge. With the muzzle of the gun a yard from the half-open door he pulled the trigger. Just as he did so his younger brother ran in at the door, and received the charge in his face. The cartridge was so small that it passed along and out of the barrel when the gun was fired off.

In the course of a fortnight the flesh wound was healed, but for weeks the state of the eyes gave cause for great anxiety. Portions of the conjunctiva had to be snipped away to remove the gunpowder, the source of great irritation; while the almost total inability to swallow reduced his strength to almost vanishing point. In November the tissues in the neighbourhood of the antrum of Highmore became inflamed, causing considerable suffering. One evening the boy had a fit of choking, and during a paroxysm brought into his mouth the brass end of a second cartridge, of the existence of which up to this date we had heard nothing. On questioning his brother who shot him, it turned out that prior to introducing the blank cartridge in the breech he had put into the breech the brass end of a cartridge (from which he had removed the paper containing the powder), which had slipped into the barrel, and he thought fallen out to the ground. The brass end had evidently remained in the barrel, and when the blank cartridge was fired off, had been projected like a bullet, and lodged in the boy's right antrum of Highmore, where it remained for four months. From the patient's symptoms it is probable that the brass end of cartridge found its way from the antrum into the posterior nares, and from thence to the pharynx, bringing on the feeling of choking. From the short distance at which the muzzle of the gun was from the patient when it was fired off, and from the line of the track of the wound, on first consideration it seemed marvellous how the brass cartridge end which lodged in the antrum did not penetrate the posterior wall of the antrum, and then the base of the skull, through the sphenoid bone, at the origin of the pterygoidens externus muscle.

The possible explanation of the boy's marvellous escape seems to be:—

(*a.*) The cartridge end and the blank cartridge were so smal that they did not nearly fill the circumference of the barrel—thus a great deal of their force was lost.

(*b.*) The powder in a blank cartridge is less in quantity and inferior in quality to a loaded one.

Somewhat problematical *c* and *d* as causes.

(*c.*) The walls of the antrum in children are much thicker than in adults.

(*d.*) Possibly the air in the antrum may have acted like a cushion in retarding the progress of the cartridge.

With the exception of a slight nebula of the cornea, which is clearing up, and a limitation of the movements of the jaw-bone, the boy is in perfect health, and in personal appearance little altered. It is possible, however, when the rest of the molar teeth in the lower jaw come in he will have considerable trouble. Dr Bell wished to acknowledge the kind assistance rendered by Dr Lavack, oculist, Aberdeen, who was at Kirkwall at the time of the accident, and of Dr Sinclair of Kirkwall.

IV. Original Communications.

1. THE ACTION OF ACIDS AND ALKALIES, AND OF SOME OTHER DRUGS, ON THE SECRETIONS OF THE BODY IN HEALTH AND DISEASE, WITH SPECIAL REFERENCE TO THEIR ACTION ON GASTRIC ACIDITY AND DIGESTION.

(From the Research Laboratory of the Royal College of Physicians, Edinburgh).

By A. Lockhart Gillespie, M.D., C.M., F.R.C.P. Ed., Medical Registrar, Edinburgh Royal Infirmary.

The theory that acids increase the secretion of glands, of which the secretion is alkaline, and that alkalies act conversely, has been very generally taught by physiologists and physicians for some years. Considerable evidence has been adduced by experimenters to prove this,—evidence chiefly based on the results obtained from experiments with the salivary fluids.

Ringer, in his *Therapeutics*, laid especial stress on the advantages to be obtained if this law held good in the treatment of stomach cases, and his views were accepted in general, without any very definite evidence as to the absolute facts of the case. But, at the same time, practice refused in most cases to follow precept, and the antagonism of alkalies and acids outside the body was regarded as taking place similarly within,—alkalies being given for acidity, acids for the reverse; in many cases with very considerable, if only transient effect.

Before looking more closely at the recent work done in connexion with the action of these bodies on the secretions of the alimentary canal, the general question of the influence of acids and alkalies on the body, as a whole, and on the more remote secretions, might be briefly examined.

In the widest sense acids may be looked on as tonic in their action, alkalies as lowering.

Their action on the blood is well known,—the administration of acids decreasing, that of alkalies increasing, its alkalinity; while the first renders it more easily clotted, the latter less so. But all acids have not the same effect. For instance, A. Freudberg ("Ueber den Einfluss von Säuren und Alkalien auf die Alkalescenz des Menschlichen Blutes und auf die Reaction des Harns," *Virchow's Archiv*, cxxv., 3, p. 566) found that HCl had little effect on the alkalinity of the blood, but strongly increased the acidity of the urine, while both lactic and tartaric acids diminish the reaction of the blood and increase the acidity of the urine to some degree. Bicarbonate of soda, on the other hand, increased the alkaline reaction of the blood and diminished the acidity of the urine.

H. J. Hamburger ("Ueber den Einfluss von Säure und Alkali auf defibrinirte Blut," *Archiv für Anat. und Phys.*, 5 to 6, p. 513, 1892) found that the administration, or addition rather, of either class of substances increased the permeability of the red blood corpuscles.

Dr Gaskell showed that dilute acids cause relaxation of the muscular substance both of the heart and of the vessels, while dilute alkalies have an opposite effect. Dr Lauder Brunton and Dr Cash (*Disorders of Digestion*, 1886, p. 343) verified this.

The reaction of the blood then may be changed, and the calibre of the vessels altered by their administration.

A much more difficult question, and one of very considerable importance, is the effect of these bodies on the metabolism of the body and on the assimilation of proteids.

G. Jawein, in an important paper on the subject ("Zur Frage über den Einfluss des doppelt Kohlensäuren resp. citronsäuren Natrium in grossen Dosen gegeben auf den Stickstoffumsatz, sowie auf die menge des 'Neutralen' Schwefels und der Æther-schwefel säuren des Harns beim gesunden Menschen," *Zeitschrift für Klin. Med.*, Bd. xxii., s. 43), in which he gives a *résumé* of some of the literature, found that in large doses the bicarbonate of soda has little effect on the nitrogen metabolism, some slight increase in the decomposition of nitrogenous bodies being observed. Proteid assimilation sinks under the influence of large doses of this salt only if a purgative action be produced. Large doses, again, bring about a water retention, a statement which corroborates some of Dr Brunton's statements (*loc. cit.*), and thus are not diuretic; they decrease oxidation, the body metabolism being altered, with an increase of preformed sulphuric acid in the urine during the alkaline periods, and they do not influence putrefaction in the intestines.

With regard to his statements, the following either acquiesce or differ:—

L. Mayer ("Ueber den Einfluss dur Natronsalze auf der Eiweissumsatz im Thierkörper," *Zeitschrift f. Klin. Med.*, Bd. iii., s. 82, 1881); L. Severin (quoted by Jawein); Damonietti and Hyades

(*Journal de Thérapeutique*, 7, 441-453); L. Klemperer (Inaug. Dissert., Dorpat); G. Gorsky (Inaug. Dissert., St. Petersburg, quoted by Jawein); and. E. Spilker ("Ueber den Einfluss der alkalien auf der Stoffwechsel, mit besonderer Berücksichtigung der Harnsäure," Inaug. Dissert., Berlin, 1889) unite in allowing an increase of proteid metabolism under the administration of alkalies, especially the carbonates of soda, potash, or lithia.

Rabuteau and Constant, on the other hand, found (*Gazette Hebdomadaire de Médecine et de Chirurgie*, viii., 2, p. 689, *et seq.*) that under these conditions the proteid metabolism was diminished. Spilker (vide *supra*) obtained a diminution also on the administration of acetate of soda, while Burchard (Inaug. Dissert., Dorpat, 1889) thought that under the bicarbonate the proteid metabolism at first fell and rose later.

Spilker, again, found that the amount of uric acid secreted rose after the administration of bicarbonate of soda, an observation which has been very strongly supported by Dr Alex. Haig (*Uric Acid as a Factor in the Causation of Disease*, 1892), but almost as strongly deprecated by Sir William Roberts (*Croonian Lectures on Uric Acid, Gravel, and Gout*, 1892).

Salkowski (*Virchow's Archiv*, Bd. lxxvii., s. 226) alleged that oxidation in dogs was reduced; and Auerbach (*Virchow's Archiv*, Bd. lxxvii.) found that the oxidation of carbolic acid in dogs was decreased if alkalies were taken.

Stadelmann, again (*Ueber den Einfluss der alkalien auf der menschlichen Stoffwechsel*, Stuttgart, 1890), found that after small doses of alkali little change in the amount of uric acid secreted occurred, and that after large doses the amount diminished. He also makes the remark that the more alkali which is added to the body the less NH_3 there is present in the urine.

The preponderance of opinion, then, appears to be on the side of an increase of metabolism after the administration of alkalies, especially in large doses. Acids, however, have far less effect in the body chemistry, being neutralised very quickly after ingestion.

The action of acids and alkalies on the various secretions of the alimentary canal may now be considered.

Both the acidity of the urine and the alkalinity of the saliva seem to vary with the acidity of the gastric contents. But the variations in the acidity of the urine are much more striking, and naturally, the urine being an excretion, more nearly allied to the amount of acid secreted by the gastric mucous membrane. In fact, the relationship between the reaction of the urine and the acidity of the gastric contents depends more on a simple process, the getting rid of a surplus acid, or the prevention of an abnormal decrease in the alkaline reaction of the blood.

The variations in the alkalinity of the saliva, on the other hand, as far as they correspond to variations in the acidity of the gastric contents, or to the amount of acid secreted in that organ, are due

to a reflex, chemical in its origin—the terminations of the nerves in the stomach wall—nervous in its course, and chemical again at its end—the cells of the salivary glands.

The administration of acids, then, increases the flow of the saliva and its alkalinity both by chemical stimulation in the mouth, and afterwards by a similar stimulation of the gastric nerves (Roberts, *Digestion and Diet*).

I have noticed that cases with hyperacidity of the stomach contents secrete more saliva than other dyspeptic patients, and this may be especially noticed when the stomach is being washed out. Patients belonging to the first category, during the proceedings continue to secrete quantities of saliva; the others secrete it, no doubt, but to a less amount.

Alkalies will act differently and practically in an opposite manner.

Coming to the consideration of the effects which the administration of these two classes of chemical agents has on the gastric secretion, I would first draw attention to the result of the exhibition of alkalies. Although it has long been held, more or less, as a "pious opinion" by physiologists that the law above cited obtains in the case of the gastric contents, still it is only lately, as far as I know, that the fact has been in part definitely proved.

Last year, in a paper which I read before the Medico-Chirurgical Society of Edinburgh, I stated that from facts which I had observed I deemed the theory to be true (*Edin. Med. Journ.*, 1893; *Transactions of Medico-Chirurgical Society of Edinburgh*, vol. xii., p. 54).

In June 1893, in the *Archives Générales de Médecine*, Dr G. Linossier and Dr G. Lemoine published a paper on this subject. They experimented on a human *ruminant*, and found that bicarbonate of soda in both large and small doses acted as an excitant of gastric secretion. Medium doses had the greatest effect, the secretion of acid necessary to antagonise the larger doses (150 grains) being so great that the normal excess of acid had not been reached when the stomach began to empty. The maximum acidity was reached in two hours after a dose of 7½ grains., in three hours after 15 grains, and in four hours after 75 grains of the alkali had been given with the food.

The production of the fatty acids, the result of fermentation, was favoured by the administration of the alkali; the acids so formed contributing to the saturation of the alkalinity.

Bicarbonate of soda acted most strongly as a promoter of the secretion of HCl if given one hour before food. If given after food the action was not so pronounced.

Carbonate of lime seemed to act in much the same way, but not so markedly.

The experimenters came to the conclusion that the exhibition of bicarbonate of soda for some time caused the excitant action to be continued beyond the actual dates of administration. In fact, it excited and prolonged the secretory activity.

These deductions apply to the normal stomach, but the authors apply them also to disordered digestion. It has still to be proved if such reasoning can be looked on as correct. The use of a case of Merycism for an investigation like the above renders the procedure very easy, the only possible fallacies being the admixture of saliva and mucus with the regurgitated bolus.

Dr M. A. Gilbert ("De l'Action du Bicarbonate de Soude sur le Chimisme Stomacal," *Memoire lu à la Société de Biologie dans le Séance* du 22 Juillet, 1893) records that bicarbonate of soda given with the food has lost its alkalinising effect after an hour if large doses be given, in half an hour to three-quarters if the doses are small. The acidity up to these hours is diminished. On the other hand, G. Hayem (*De la Medication anti-dyspeptique*, 1892, p. 387) found that small doses of this salt aggravated the symptoms of a case of *hyperpepsic* if given before meals; the free HCl was increased, the combined reduced. He recommended in such cases that it should be given with, not before, food.

While Dr Henri Huchard (*Revue Générale de Clinique et de Thérapeutique*, 1893, No. 3, p. 35) shows that large doses of alkalies, especially of the bicarbonate of soda, are without danger, and of distinct use in combating an acid dyspepsia. He gave a man five to six ounces of this salt a day for this purpose without ill effect. He argues, further, that such massive doses do not influence the general bodily health malignly, nor do they produce an atrophy of the gastric glands, as asserted by some.

This short review of the available literature on this part of the subject shows that while not very much has been done with regard to it, still some striking facts have been arrived at. It also shows that very considerable diversity of opinion obtains with regard to the local action of alkalies in treating dyspepsia.

So far, then, the investigations have been carried out almost exclusively on healthy people, and have been all on the side of the alkalies. I determined to test some other aspects of the case,—that is to say, the influence of both alkalies and acids on dyspeptic patients, as well as on those with healthy digestions.

As the experiments were conducted on different subjects, to whom different drugs were given, it will be easier to group the details with regard to the patient rather than in connexion with the drugs. In this way the varying acidities may be better contrasted with the control observations, while the results obtained may be afterwards summarised.

Methods.

The method used in the researches was a simple modification of Hayem and Winter's procedure, in which the acidity, not the Cl, was tested in each case,—the total acidity in the usual way, the combined acidity after evaporation to complete dryness at 100° Cent., and by again testing the remaining acidity, and the free

acidity by subtracting the second of the values thus obtained from the first. The presence or absence of free HCl was determined by both Liebermann's and Günzberg's tests; the presence of the organic acids by Uffelmann's reagent. Quantitative estimations of lactic acid were obtained by removing it with ether from a known quantity of fluid and estimating the acidity left.

A full description of these methods will be found in the *International Medical Magazine* for October 1893.

The acidities throughout are calculated in terms of HCl per cent. Where alkalinities have been given they are calculated in terms of HCl per cent. equivalents.

Experiments.

As long ago as the winter of 1888, when resident in Dr Muirhead's Wards in the Royal Infirmary, I tested the effect of large doses of alkalies in a case of hyperacidity and dilated stomach.

The patient, A. B., æt. 41, had a dilated stomach reaching to 1½ inch of the pubis. The contents were always very acid,—so acid that no organisms, save an occasional sarcina ventriculi—an organism which lives unconcerned in an acidity capable of killing all others—were ever found in them. The cause of the excessive dilatation was evidently a fibrous contraction of the pylorus.

Cancer was negatived by the duration and the acidity. The only treatment which afforded him the slightest relief was regular lavage, which he practised every evening. The acid present in the stomach contents was largely HCl, and proteids, therefore, relieved his symptoms for a time; but so little food could pass through the pylorus, that he was compelled, sooner or later, to withdraw the contents. Hydrochloric acid was not secreted in the absence of food.

All experiments were done after tea, which was at 4 P.M. He withdrew the contents of his stomach four hours afterwards. His meal consisted of bread and butter and weak tea.

1.—Mean of three control experiments:—

Total Acidity.	Acidity of Urine.
·54 per cent.	·154 per cent.

Free HCl present in abundance.

2.—Given ʒij. sodii bicarbonat. at 2 P.M., shortly after dinner. Contents tested and urine procured at usual time:—

Total Acidity.	Acidity of Urine.
·456 per cent.	·036 per cent.
·536 per cent.	·068 per cent.

Free HCl present on both occasions.

3.—Given grs. xx. sodii bicarbonat. every hour from 2 to 6. Contents removed as before:—

Total Acidity.	Acidity of Urine.
·522 per cent.	·04161 per cent.

Free HCl present.

4.—Given grs. xx. sodii bicarbonat. every hour from 3 to 8 P.M., or 120 grs. in all. One hour after the last dose acidity tested :—

Total Acidity.	Acidity of Urine.
·41 per cent.	——
·514 per cent.	·0861 per cent.

Free HCl present on both occasions.

5.—Given grs. cxx. four hours after tea. One hour afterwards the acidity was :—

Total Acidity.	Acidity of Urine.
·1314 per cent.	·456 per cent.

6.—Stomach contents tested as before without the previous exhibition of alkalies :—

Total Acidity.	Acidity of Urine.
·48 per cent.	·153 per cent.

7.—On three succeeding afternoons grs. x. lithia bromide were given at 4, 5, and 6 P.M. The contents tested at 8 P.M. :—

Total Acidity.	Acidity of Urine.
·45 per cent.	·108 per cent.
·438 per cent.	·144 per cent.
·48 per cent.	·09 per cent.

All the acidities are in terms of HCl per cent., and the urines examined were always those passed at the time.

With regard to the patient's symptoms, he asserted that the freedom from pain afforded by these alkalies was extremely transient, and that the recurrent pain seemed more severe. This is fully borne out by the observation that one hour after the administration of 120 grs. of bicarbonate of soda the stomach contents were still acid, and contained a considerable quantity of free HCl.

The decrease in the acidity of the urine on these occasions in which the drug had failed to reduce the acidity of the gastric contents is instructive. It is due either to increased alkalinity of the blood, owing to the increased secretion of acid to neutralise the ingested alkali; or simply to the added alkali. On one occasion, that on which one large dose of the bicarbonate was given one hour before testing, the urine was very acid,—the alkali had evidently not had time to act.

To sum up: the experience gained from such a case corroborates the results arrived at by Lemoine and Linossier in so far that it proves that large doses of alkali only subdue excessive acidity of the gastric contents for a short time. Their experiments on a healthy digestion showed that the secreting power of the HCl cells of the stomach is increased by the administration of alkalies; mine show that in a case of hyperacidity alkalies fail to check the excessive secretion of acid. These experiments, however, do not show any aggravation of the acidity, and, in fact, the three observa-

tions after the administration of bromide of lithium reveal perhaps a slight diminution of the acidity both of the gastric contents and, to a very small amount, of the urine.

The next case in which I had an opportunity of observing the effects of the administration of drugs came to me at the New Town Dispensary in January 1893:—

"A. L., æt. 35, has been ill for some years off and on. Was treated with rhubarb, bismuth, and soda with temporary effect. Has pain after food, especially after vegetables, flatulence, and evidences of a much dilated stomach with fermentation. Stomach contents three hours after an ordinary dinner: Total acidity, ·123 per cent.; combined acidity, ·1006 per cent.; free acidity, ·0224 per cent.; a trace of free HCl; butyric acid present, and after standing for thirty-six hours an odour of H_2S was noticed. I gave him somewhat large doses of HCl, after food, with good results." (Notes taken at the time.)

In June he was admitted to Ward 22 of the Royal Infirmary suffering from his old complaint. Dr. G. A. Gibson kindly asked me to see him and treat him. His symptoms were then very much the same. He had pain after food, heartburn, and pyrosis. He was very sleepless. His stomach was washed out thrice daily. The stomach contents three hours after dinner gave the following acidities: Total acidity, ·2883 per cent.; combined acidity, ·1698 per cent.; free acidity, ·1185 per cent.; no free HCl. Butyric and acetic acids present. Given hyposulphite of soda with some benefit to his symptoms, but he was still very sleepless.

Treatment was commenced on June 27th. He was given throughout the ordinary diet of the Infirmary, with the addition of an egg at tea-time. He washed his stomach out every morning before breakfast, and during the first series of experiments before dinner. Two hours after tea the stomach contents were syphoned off in sufficient quantity to test.

During the other series of experiments the stomach contents were removed one hour before tea instead of before dinner, as the remnants of the dinner interfered with the accuracy of the observations. Such a cleansing of the stomach before experimentation is very needful in cases of dilatation of the organ.

In the accompanying Table the details of four series of experiments will be found. From a study of these it is plain that even heroic doses of the dilute hydrochloric acid, B.P., have little or no effect in increasing the secretion of acid in the stomach. That, in fact, they have a very considerable retarding effect will be evident from a consideration of the figures and what they imply. In no instance does the acidity after administration of the acid reach that recorded in the control observations. Less, then, has been secreted. But the amount is still less if it be remembered that very considerable quantities of the very acid required were added to the contents, generally indeed before, but with only slightly

TABLE I.

	Of drug given.		Gastric Contents.											Urine Acidity. Per Ct.	Notes.
			Quantitative Acidity.			Qualitative Acidity.				Proteids.					
	Dose.	Time.	Total. Per Cent.	Combined. Per Ct.	Free. Per Cent.	Free. HCl.	Free. Acetic.	Free. butyric.	Lactic.	Albumin. Per Ct.	Acid albumin.	Proto-albumose.	Deutero-albumose.	Peptone	
SERIES I.															
HCl given *before* tea.	1 —	—	·2993	·2847	·0146	—	+	+	+	·068	Trace.	+	+	+	·0328	Sleepless, costive, heartburn, urine scanty, gastric pain, feeling of malaise.
	2 40 m	1 hour.	·2263	·1825	·0438	—	+	+	+	·04	,,	+	+	?	O	Slept well. HCl given before each meal.
	3 60 ,,	1 ,,	·2336	·219	·0146	—	+	+	—	·043	,,	+	+	+	—·0328	,,
	4 120 ,,	1 ,,	·2336	·2044	·0292	—	+	+	—	·032	,,	+	+	+	—·002	,, Feeling better.
	5 120 ,,	½ ,,	·2482	·1971	·0511	—	+	+	—	·056	,,	+	+	+	+·0146	,, Urine increasing.
	6 120 ,,	½ ,,	·2117	·1824	·0293	—	+	+	—	·005	,,	+	+	+	·0146	,,
	60 ,,	½ ,,														
	7 120 ,,	½ ,,	·2409	·2263	·0146	—	+	+	—	·002	,,	+	+	+	·0219	,,
SERIES II.															
HCl given *before* tea, and after stomach washing.	1 —	—	·2701	·2595	·0106	—	+	+	—	·044	,,	+	+	+	·0109	Is feeling better, sleep not good, heartburn. HCl only left off one day.
	2 60 ,,	½ ,,	·2263	·1898	·0365	—	+	+	—	·074	,,	+	+	+	·0219	Slept well.
	3 120 ,,	½ ,,	·2482	·2117	·0365	—	+	+	—	·04	,,	+	+	+	·0073	,,
	4 60 ,,	½ ,,	·1825	·146	·0365	—	+	+	—	—	—	+	+	+	·0292	,,
	120 ,,	½ ,,														
	5 120 ,,	½ ,,	·2044	·1971	·0073	—	+	+	—	·054	Trace.	+	+	+	·0219	,,
	120 ,,	½ ,,														
SERIES III.															
HCl *after* tea.	1 60 ,,	½ ,,	·2372	·2263	·0109	—	+	—	—	·052	,,	+	+	+	·0146	,,
	60 ,,	½ ,,														
	2 60 ,,	½ ,,	·2555	·2263	·0292	+	+	+	+	·011	,,	+	+	+	·0109	Some discomfort and heartburn.
	120 ,,	½ ,,														
	3 120 ,,	½ ,,	·2628	·2445	·0209	+	+	—	—	·024	,,	+	+	+	·0219	More pain.
	120 ,,	½ ,,														
SERIES IV.															
NH_4Cl *before* tea and *after*.	1 10 grs.	½ ,,	·2044	·2004	·004	—	+	—	—	—	—	—	—	—	·0365	Slept well.
	2 10 ,,	½ ,, before each meal.	·2044	·2004	·004	—	+	—	—	—	Trace.	+	—	—	·0584	,, Feeling "a new man!"
	3 20 grs.	½ hour.	·2482	·2097	·0385	—	+	+	—	·075	,,	+	+	+	·0109	,, Bowels normal.
	4 20 ,,	½ ,,	·2628	·2263	·0365	—	+	+	+	·095	,,	+	+	+	·0365	,, Gaining weight.
	20 ,,	½ ,,														
	5 20 ,,	½ ,,	·3212	·2701	·0511	+	+	+	—	·047	,,	+	+	+	·0292	A little heartburn; feeling well.
	6 10 ,,	½ ,,	·292	·2555	·0365	+	+	+	—	·0·9	+	+	+	+	·0438	Is very well.
	10 ,,	½ ,,														

increased effect if after, food. Even such a large dose as 240 ℥ of a 10·5 per cent. solution of HCl—which contains 25·2 ℥ of pure HCl, and which would make ·3 per cent. solution of HCl in 17·5 ounces of fluid—within half an hour before or after tea has little effect.

The total acidity is diminished by the administration of HCl, more markedly if it be given before the meal. In large doses the effect is more marked.

The combined acidity is still more decreased, the free being naturally somewhat larger. Throughout the experiments no free HCl was present until 180 and 240 ℥ of the dilute acid had been given after food, and then only in small quantity in the first instance, though more in the second. Acetic acid was present throughout, as also a trace of butyric, and except when large doses of acids were given after meals, the exhibition of HCl seemed to have little effect on them. Lactic acid was only doubtfully present on these occasions.

With regard to the proteids there is little to be said. Very small quantities of coagulable proteid could be recovered, and in Series I. these seemed to get smaller the more HCl was given. The lower proteids were constantly and abundantly obtainable.

The reaction of the urine—that is, of the specimen passed at the time of withdrawing the stomach contents—was always almost neutral, and did not vary much.

The patient's general health became much better. He slept well, his urine became more copious, the action of his bowels more regular, and he expressed himself as feeling better all over. But—and this is a large but—if the HCl was left off for a day, the symptoms, though not so aggravated, recurred. By far the most striking part of the experiment must now be analysed. Owing to some remarks made to me by Mr A. G. Miller concerning the extraordinary efficacy which chloride of ammonium had in subduing the pain and discomfort of dyspepsia in his own case, I determined to give this drug a trial.

The effect surpassed my most sanguine expectations. Series IV., in the foregoing chart, illustrates this. The administration of 10 grains of the chloride of ammonium in water half an hour before food decreased the acidity, subdued all discomfort, and by the second day he told me, and he looked it, that "he was a new man." Twenty grains similarly given, although the acidity was higher, produced the same effect, as did 40 grains.

On the other hand, 20 grains given half an hour after food increased the acidity very considerably, a similar result being obtained by the administration of 10 grains a quarter, and 10 grains half an hour after his tea. In both the last instances free HCl appeared in the stomach contents, and the patient felt a little incommoded locally, very "fit" generally.

Throughout this last series the acidity of the urine was in-

creased, and the amount of coagulable proteid in the gastric contents larger.

The striking part of the experiment is the fact that 20 grains NH_4Cl after food was able to increase the acidity more than 240 ℥ of dilute HCl, considerably more than 180 ℥, and much more than 120 ℥ given at a similar time; while another proof that the drug was performing a useful function presented itself in the general and obtrusive well-being of the patient.

For further use the dose of the ammonium chloride was reduced to grs. xv. before food, and I heard from the patient, some months afterwards, that he was keeping in good health by this means, and had not to take the powders so often.

So much for the effect of acids and chloride of ammonium in a case of dilated stomach with fermentation.

I now performed similar experiments on a case of cancer of the stomach in a man of 43 with the usual symptoms. Stomach somewhat dilated.

The drugs were given before or after a tea of bread and butter and a cup of tea. The contents were removed two hours later, and a specimen of urine passed and secured at the same time.

TABLE II.

Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl	Lactic.	Acetic.	Butyric.	Albumin.	Urine.
—	—	—	·0547	·0536	·0011	—	+	+	—	p.c. ·3	—
—	—	—	·0638	·0547	·0091	—	+	+	—	?	·4745
HCl	3 s.	1 hour before	·09125	·09125	0	—	0547	—	—	?	·365
HCl	3j.	½ hour before	·01825	·01825	0	—	+	—	—	?	·419
HCl	3j.	¼ hour before	·03673	·03662	·00011	—	+	+	—	·066	·273
HCl	3j.	¼ hour after	·1095	·09125	·01825	—	+	+	—	?	·09125
NH_4Cl	20 grs.	½ hour before	·0365	·0365	0	—	+		—	?	·31025
NH_4Cl	20 grs. 20 grs.	½ hour before ½ hour before	·073	·073	0	—	+	—	—	?	—
$NaHCo_3$	30 grs.	½ hour before	·0547	·0547	0	—	+	—	—	?	·20075
$NaHCo_3$	30 grs. 30 grs.	½ hour before ¼ hour before	·1095	·09125	·01825	—	+	+	—	?	·2515

It will be at once noted that here the conditions are exactly reversed,—the acidity of the gastric contents being almost of the same percentage as that of the urine in the preceding case, while the urine is very acid. In the stomach of this patient, also, large quantities, proportionally, of lactic acid were always present.

On the three occasions in which HCl was given before the meal the total acidity was diminished, except in the first, when there was an unusual development of lactic acid. This was extracted

by shaking with ether and estimated. In the other two cases the diminution was marked.

When 3j. of the dilute acid was given after the tea, however, the acidity increased, while the acidity of the urine decreased.

In this case the chloride of ammonium did not produce any striking results. Forty grains increased the acidity more than 20 grains.

Bicarbonate of soda in 30 and 60 grains before food did not diminish the acidity in the first case; while in the second, the larger dose, the acidity equalled that produced by 3j. HCl after food. In both cases the acidity of the urine was lowered, but not so markedly as after the 3j. HCl after food.

Free hydrochloric acid was never present during any of the experiments in this patient.

Even in a cancerous stomach, then, the rule with regard to these drugs, laid down before, holds good, though not to so pronounced an extent. The cells, in fact, do not respond so briskly to the excitant,—an argument, this, in favour of the cause of the diminished acidity found in most cancer cases, being due to decreased activity of the cells of the mucous membrane of the stomach, apart from the actual cancerous portion.

The next patient on whom I tried the effect of drugs was a man suffering from a chronic gastritis, age about 45. He had the usual symptoms of pain after eating, sometimes with vomiting, emaciation, inability to eat anything but the simplest foods. He had seldom any flatulence. It was evidently a case in which, owing to long-continued chronic catarrh of the mucous membrane of the stomach, digestion was impaired owing to scanty acid secretion. Examination of the stomach contents corroborated this view. The results are depicted in Table III.

Results of the Administration of the Dilute Acid.

A. The preliminary control experiment shows that there was no fermentation going on, but that the secretion of HCl was defective, and was insufficient to saturate the proteids ingested at the time (two hours after food), when free HCl is ordinarily present.

On the exhibition of moderate doses of the B.P. HCl before tea the acidities fell markedly, but after 120 ℥ a trace of free HCl appeared, a very slight trace, while the acidity rose again to near that of the control. The still larger dose of 180 ℥ within half an hour increased the acidity over that previously demonstrated,—no free HCl being present, however, in this instance. The increase of acidity following on the larger doses, in this case, might have been due to defective absorption.

Similar large doses of the acid given after the meal increased the acidity very considerably, 120 ℥ causing the presence of a trace of free HCl.

The acidity of the urine in this case varied very much throughout, but was never very high or very low.

TABLE III.

Date.	Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl.	Lactic.	Acetic.	Butyric.	Urine Acidity.
July 31	—	—	—	·146	·146	0	—	—	—	—	·1095
Aug. 1	HCl	30 m	½ hour before	·0624	·0624	0	—	—	—	—	·1095
„ 2	HCl	60 m	½ hour before	·09126	·09126	0	—	—	—	—	01825
„ 3	HCl	120 m	½ hour before	·12775	·12518	·00457	+	—	—	—	·12775
„ 4	HCl	120 m 60 m	½ hour before ½ hour before	·20·75	·20075	0	—	+	—	—	·073
„ 5	HCl	60 m	½ hour after	·2828	·2828	0	—	—	—	—	·1095
„ 6	HCl	120 m	½ hour after	·2737	·2709	·0037	+	+	—	—	·073
„ 7	NH_4Cl	10 grs.	½ hour before	·2117	·2007	·011	—	—	+	—	·073
„ 8	NH_4Cl	20 grs.	½ hour before	·2737	219	·0647	+	—	+	—	·09125
„ 9	NH_4Cl	40 grs.	½ hour before	·292	·1825	·1095	+	—	+	—	·1095
„ 10	NH_4Cl	20 grs.	½ hour after	·2555	·219	·0365	+	—	+	—	·1825
„ 11	NH_4Cl	40 grs.	½ hour after	·2555	·219	·0365	+	—	+	—	—
„ 12	NaCl	10 grs.	½ hour before	·292	·2555	·0365	—	—	+	—	·073
„ 13	NaCl	20 grs	½ hour before	·2555	·2555	0	—	—	—	—	—
„ 14	Liq. Am. Acetatis	ʒss.	½ hour before	·16425	·16425	0	—	—	—	—	·20075
„ 15	Liq. Am. Acetatis	ʒj.	½ hour before	·23725	·23725	0	—	—	—	—	·073
„ 16	NH_4Br	20 grs.	½ hour before	·1825	·146	·0365	—	+	+	—	·075
„ 17	NH_4Br	40 grs	½ hour before	·20075	·20075	0	—	+	—	—	·20075
„ 18	$NaHCo_3$	10 grs.	½ hour before	·1825	·1825	0	—	—	—	—	·164
„ 19	$NaHCo_3$	10 grs.	½ hour before	·1825	·1825	0	—	—	—	—	·073
„ 20	$NaHCo_3$	10 grs.	½ hour before	·146	·1095	·03625	+	—	—	—	·065

B. On the exhibition of ammonium chloride different results were obtained. The acidity kept high, and free HCl was abundantly present, except in the first instance, in the gastric contents. After 40 grs. given before tea the acidity reached ·292 per cent. as HCl, of which ·1095 per cent. was free, a large part being free HCl. Throughout this series, too, the fluid obtained gave the reaction with Uffelmann's reagent characteristic of acetic acid, although, on attempting to form the acetic ether from it, I met with no great success.

The chloride of ammonium given after the meal, although the acidity kept at a high level, was not quite so active.

The small number of the experiments performed with chloride

of sodium negatives their value to a large extent. On both occasions, however, the total acidity was high, although no free HCl appeared to be present in the gastric contents.

Half-ounce and ounce doses of the liquor ammonii acetatis diminished the acidity slightly, when compared with the foregoing; it still remained above that of the commencement, however. On the second day the acidity of the urine had fallen, the fall continuing through the next day.

With 20 and 40-grain doses of bromide of ammonium no great change in the acidity was observed.

Small doses of bicarbonate of soda, however, without very materially increasing the acidity, did not diminish it, and after 20 grs., free HCl was detected in the stomach contents. The urine became less acid.

On the whole, then, the series of experiments on a case of chronic gastric catarrh has given rise to very much the results which one might have *à priori* expected. That is to say, that the action of the drugs is identical with, but inferior to, their action on more healthy mucous membranes. The acidity was lowest when the patient was getting an acid before meals; highest with ammonium chloride. The free acidity also was most manifest when this last drug was being given.

Again, the patient's well-being was greatest when the supply of HCl was most. He had more appetite, less feeling of weight and discomfort. With him also chloride of ammonium and bicarbonate of soda (if given before meals in the latter instance) gave most relief.

In another case, one of a nervous dyspepsia with somewhat indefinite symptoms, in a middle-aged man, I made only three observations.

The contents of his stomach were removed one hour after food, —one of the symptoms of his malady being the rapidity with which that organ emptied itself. Two hours after an ordinary meal of bread and butter and tea nothing could be obtained from his stomach, the wash-water, indeed, coming back almost unsullied.

In this case, again, the chloride of ammonium increased the acidity very materially.

TABLE IV.

Date.	Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free HCl.	Lactic.	Butyric.	Urine.
Aug. 23.	—	—	—	·1825	·1825	0	+	—	·1095
,, 24.	NH_4Cl	grs. xxx.	½ hour before	·219	·20075	0	+	+	·1095
,, 25.	NH_4Cl	grs. xx. grs. xx.	½ hour, ½ hour } before	·3285	·292	0	—	+	·146

Through the kindness of Mr F. M. Caird, I was enabled to repeat some of these observations on the healthy stomach. A girl of 16 had drunk some soda solution in mistake for lemonade. Her

œsophagus became totally occluded. Gastrostomy was performed. Nothing could reach the stomach from the mouth for some time. When I commenced my observations very small quantities of fluid could be swallowed. She was fed entirely by the fistula.

This patient then was fed at 4 P.M. every day through the gastrostomy tube with either an egg, beaten up in half a pint of milk, or an equivalent amount of Benger's food. The nourishment being all in the fluid state, the stomach contents had to be removed earlier for testing purposes. Each day, then, an ounce was drawn off through the tube one hour and a half after the meal.

On two succeeding days—on the first after Benger's food, on the second after an egg and milk—the contents of the stomach were analysed. The acidities were found to be high, especially after the Benger's food, but the free HCl present was practically the same in amount on each occasion. No organic acids could be discovered, while there were present the various forms of the lower proteids in abundance.

The influence of dilute hydrochloric acid, both when given before and after food, was first investigated. The amount of proteids and the various forms of these bodies present in the contents when removed at 5·30 P.M. were not worked out quantitatively. Throughout the series the lower forms were abundantly present, while on every occasion the organic acids were conspicuous by their absence. The amount of acid present, being wholly hydrochloric, total, combined with proteids or free, gave sufficient evidence of the action of the drug and of the then state of digestion or of the further possibilities.

TABLE V.—NATURAL DIGESTION AND HCl.

Date.	Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Presence of Free HCl.	
Oct. 12	—	—	—	·365	·27375	·09125	+	
,, 13	—	—	—	·34675	·2555	·09125	+	
,, 16	HCl	℥j.	At time	·27375	·27375	·0	—	
,, 18	HCl	℥j.	Just before	·31	·237	·073	+	
,, 19	HCl	℥j.	½ hour before	·2555	·2555	·0	—	
,, 21	HCl	℥j.	½ hour before	·346	·273	·073	+	
,, 22	HCl	30 ♏	Just before	·365	·3467	·0183	+	
,, 23	HCl	30 ♏	½ hour before	·3285	·3285	·0	—	
,, 24	HCl	30 ♏	½ hour before	·3285	·31025	·01825	+	
,, 25	—	—	—	·3285	·27375	·05475	+	
Nov. 1	HCl	℥j.	½ hour after	·60225	·365	·23725	+ +	No discomfort.
,, 2	HCl	℥j.	½ hour after	·6805	·2555	·375	+ + +	
,, 8	HCl	℥iss.	½ hour after	·49275	·27375	·219	+ +	

From this series the following points are of importance:—

1. The normal acidity in this patient was close upon ·34 per cent., as HCl, varying from ·32 to ·36 per cent., at one hour and a half after tea.

2. The combined acidity at that time after the food was taken was from ·25 to ·27 per cent., the free acid present being therefore abundant.

3. The administration of drachm doses of dilute HCl both with and before food diminished the total acidity very considerably, except when given half an hour before.

4. The combined acidity did not fall on these occasions, therefore the free acidity was very much less, being, in fact, on two occasions absent.

5. Half-drachm doses of dilute HCl before food did not reduce the total or the combined acidity, but very markedly lessened the quantity of free HCl recovered.

6. In very striking contrast to the series in which HCl was given before food, the acidities of the stomach contents, when the acid was given in drachm doses after food, rise very high,—to ·49 and ·63 per cent. Naturally the combined acid, except on one occasion, does not show so decided a difference, so that the free acid is largely increased.

7. Free HCl up to ·2 and ·3 per cent. in a healthy youthful stomach causes no pain or discomfort.

8. Throughout the experiments the girl gained several pounds in weight.

TABLE VI.

NATURAL DIGESTION AND NH_4Cl.

Date.	Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl.
Oct. 25	—	—	—	·3285	·27375	·05475	+
„ 26	NH_4Cl	grs. xv.	With supper.	·16425	·16425	·0	— Powder not given at tea by mistake, supper only beef-tea.
„ 27	NH_4Cl	grs. xv.	With tea.	·3285	·292	·0365	+
„ 28	NH_4Cl	grs. xv.	¼ hour before tea.	·38325	·2555	·12775	+
„ 29	NH_4Cl	grs. xv.	¼ hour before tea.	·219	·219	·0	— Very feverish. Temperature 102°.
„ 30	NH_4Cl	grs. xv.	¼ hour after tea.	·31025	·27375	·0365	+ Still not right.
„ 31	NH_4Cl	grs. xv.	¼ hour after tea.	·292	·2555	·0365	+

This series of observations was very unluckily largely negatived by a smart attack of fever during its continuance. The observation, also, made on Oct. 26th is of no good as one of a series. The drug had not been received by tea-time, and was given instead at supper-time, after beef-tea and some bread or biscuit. The contents were removed before the hour and a half. On only one occasion was the acidity increased,—*i.e.*, on Oct. 28th,—when 15 grs. had been given a quarter of an hour before tea, and here, too, the free acid increased largely also. During the feverish attack, as was to be expected, the acidity diminished and the free acid disappeared or was much less.

From the observations made on the 27th and 28th of October, however, I expect that sal ammoniac has not that power of so powerfully influencing the reaction of the gastric contents in health which we have seen that it possesses in some cases of disease.

Three experiments were now performed with NaCl as follows (see Table VII.):—

TABLE VII.

Date.	Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl.
Nov.							
4	NaCl	grs. xxx.	With tea	·3285	·292	·0365	+
5	NaCl	grs. xxx.	½ hr. before	·4015	·3285	·073	++
6	NaCl	grs. xxx.	½ hr. after	·34675	·20075	·146	+++

Common salt, therefore, with food exerts little influence on the acidity. Before food the acidity seems to be increased, while after it, although the total acidity was much the same, yet the free acidity was somewhat largely increased. That is to say, the combining power of the HCl was decreased, or, what was more likely, secretion delayed.

I used the Tinctura rhei (B.P.) for the next six series of experiments, giving it both before and after meals.

I obtained such uniform results that I deemed six experiments sufficient. In each case when the rhubarb was given before the meat the acidity rose above the mean for the patient. From the figures given above it will be noted that on the three occasions on which the drug was given before tea the total acidity exceeded ·4 per cent. and the combined acidity exceeded ·25 per cent. On the other three days, the drug, given after tea, failed to raise the total acidity above ·34 per cent., or the combined acidity above ·23 per cent. The free acidity varied considerably, the balance of the evidence being slightly on the side of an increase after the exhibition of the drug before meals.

From this we may reasonably conclude that rhubarb given in stomachic doses before meals not only hastens but augments the secretion of HCl by the gastric mucous membrane.

TABLE VIII.

Date.	Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl.
Nov.							
14	T. rhei	℥j.	½ hr. before	·4015	·3285	·073	+
15	„ „	℥j.	„ „	·438	·2555	·1825	++
16	„ „	℥j.	„ after	·3285	·219	·1095	+
17	„ „	℥j.	„ „	·34675	·23725	·1095	+
18	„ „	℥iss.	„ before	·41975	·3285	·09125	+
19	„ „	℥iss.	„ after	·31025	·219	·09125	+

The following series of experiments is satisfactory in the first five instances. After the fifth the stomach-tube slipped out and

was with some difficulty replaced. The reinsertion of the tube caused the patient some discomfort and a good deal of unrest, during which the sixth experiment was performed. The result of this one, presumably owing to these circumstances, does not coincide with that of the others.

As no fluid to speak of could find its way from the mouth into the stomach, a very favourable opportunity presented itself for testing the alleged reflex influence of mastication on the stomach excretion with especial regard to its acidity. Accordingly the patient was instructed on the first day to refrain from chewing anything for some time before tea and after it, until the fluid was withdrawn an hour and a half afterwards. On the second day she was given a certain amount of bread and butter to chew at the time when the egg and milk were poured into her stomach. She spat out the bread and butter after mastication. On the following two days the experiment was varied; on the first the same amount of bread was broken up and added to the fluids given at meal-time, while on the second the patient chewed a similar quantity of bread very thoroughly, and it was then passed into the stomach through the tube along with the ordinary food. The last two experiments were repeated.

TABLE IX.

Date.		Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl.
Nov. 7	No mastication	·31025	·292	·01825	+
,, 8	Chewed bread	·38325	·31025	·073	+
,, 9	No mastication; bread broken up and added to fluid given	·365	·34675	·01825	+
,, 10	Chewed bread added to fluid	·41975	·365	·05475	+
,, 11	As on 9th	·365	·34675	·01825	+
,, 13	As on 10th	·27375	·27375	0	0

On each occasion, therefore, on which no chewing was allowed the total acidity was normal, the free acidity very small. On the other hand, when the patient was allowed to masticate something the acidity rose in the first two instances, and the free acid became much more plentiful. On the third occasion, as explained above, the results did not tally with the others, due probably to the trouble incident on replacing the tube and the changes in the times of feeding consequent thereon.

The rise in acidity in the second of the series can only be due to mastication alone, as nothing was introduced into the stomach except the usual egg and milk. In the fourth the rise, which was a little more pronounced, may have been partly caused by the alkalinity of the saliva introduced with the chewed food, partly by the act of chewing, as in the former instance.

I now determined to try shortly the effect that warm water would have if introduced before, with, and after food, not expecting to find much more than would be caused by simple dilution In

each case a tumbler of warm water was introduced into the stomach at the times indicated below:—

TABLE X.

Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl.
½ hour before tea	·365	·34675	·01825	+
With tea	·2555	·2555	0	—
½ hour after tea	·219	·16435	·05465	+

Given before food, then, the water had no appreciable effect on the total or combined acidity. Given with food, the total acidity an hour and a half afterwards was much decreased, while the HCl had not had time to saturate all the proteids present, possibly owing to lessened secretion. When the water was poured in after food, however, the effect appears simply to be one of dilution, free acid being abundantly present. These observations, however, are not numerous enough to found any conclusions on.

On reconsidering the results of the observations which I had been able to make on this patient, it appeared to me that it was unfortunate that I had not used other acids than HCl in some of the experiments. To remedy this omission I made use of both dilute nitric and dilute phosphoric acids in a similar manner to that in which I had used the hydrochloric acids.

I first gave half drachm and then drachm doses of dilute nitric acid in a little water to the patient.

TABLE XI.

Date.	Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl.	Free HNO_3.
Dec. 7th	HNO_3	ʒss.	½ hour before	·31025	·292	·01825	+	—
„ 8th	„	„	At time	·3285	·3285	·0	—	—
„ 9th	„	„	½ hour after	·49275	·219	·27375	+	Trace
„ 10th	„	ʒj.	½ hour before	·31025	·292	·01825	+	?
„ 11th	„	„	At time	·4015	·365	·0315	?	Present
„ 12th	„	„	½ hour after	·85775	·27385	·5849	?	Present

Even a cursory examination of these figures reveals the fact that the acidity of the gastric contents is not increased by the administration of large doses of dilute HNO_3 before a meal. In fact, as the normal acidity of this patient's stomach contents an hour and a half after her regulation tea has been shown to be ·328 per cent., as a rule, or a little above it, a slight diminution in acidity may be chronicled.

ʒss. of the acid had no effect when given with the food, except in so far as it might have caused the disappearance of the free acid usually found, while even ʒj. with the food only increased the total acidity slightly, to ·4 per cent.

Quite a different condition is found after the administration of the acid after food, ʒss. bringing the acidity up to ·49 per cent. with ·27 per cent. free, and ʒj. to ·857 per cent. with ·58 per cent. free. The combined acidity in each case remained almost unaltered. These figures correspond to those obtained in the HCl series, but are somewhat greater. No discomfort was caused by so great an acidity as ·857 per cent.

Doubts might be raised as to the competency of drawing conclusions from evaporation experiments when so much HNO_3 had been added. These doubts could not by any possibility be cast on the total acidity figures, which are of themselves remarkable.

I had not time to investigate further into the composition of the gastric juice and contents removed with so great an admixture of HNO_3 in it. Some interesting problems as to the combination of proteids with the two acids and in the presence of both present themselves. I hope at another time to be able to inquire further into the matter.

Dilute nitric acid, then, given before meals does not increase the acidity, it may diminish it slightly; given with the food in 30 ♏ doses it has no effect, in 60 ♏ it increases the acidity slightly; given after food in 30 or 60 ♏ doses the acidity is very much increased, but, from the fact that the combined acidity is stationary, it is probable that digestion is not accelerated.

Similar observations were now made as to the effect of dilute phosphoric acid given in similar doses.

TABLE XII.

Date.	Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl.
Dec. 14th	Ac. Phos. Dil.	ʒss.	½ hour before	·365	·3285	·0365	+
„ 15th	„ „	„	At time	·34675	·3285	·01825	+
„ 16th	„ „	„	½ hour after	·48362	·365	·11862	+
„ 17th	„ „	ʒj.	½ hour before	·438	·365	·073	+
„ 18th	„ „	„	At time	·365	·365	—	—
„ 19th	„ „	„	½ hour after	·4745	·38325	·09125	+

In ʒss. doses the phosphoric acid acts in a very similar manner to the nitric acid. In both cases the free acid is least when the acid has been given with the food, while the total acidity is greatly increased by administration after the meal. It is noteworthy that the combined acidity in these three instances is high, owing, of course, to the inclusion of the non-volatile phosphoric acid (it is only volatilised by a dull red heat) in the residue after evaporation at 100°.

No diminution of the acidity occurred after the exhibition of the drug before food. The acidity was least when the acid was given with it.

The same remarks may be applied to the figures obtained with drachm doses. The acidity throughout is increased, but is least when the acid was given along with the food; indeed, on that occasion no free hydrochloric acid could be obtained.

These variations in the acidity were so constant, that I repeated the last three experiments in order to see if they would still persist.

TABLE XIII.

Date.	Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl.
Dec. 19th	Ac. Ph. Dil.	℥j.	½ hour before	·41975	·3285	·09125	+
„ 20th	„ „	„	At time	·4015	·365	·0365	+
„ 24th	„ „	„	½ hour after	·5657	·3822	·1825	++

The figures are somewhat higher in this series, but the continuance of the administration of the acid may account for this. The relation of the figures to one another is much the same, least when the acid was given with the food, most when it was given after it.

These figures demonstrate that acidum phosphoricum dilutum does not diminish the acidity of gastric contents whether it is given before, with, or after meals. With the food the acidity is less raised than in the other two cases.

I will bring together here some of the facts observed in this case when acids were given.

TABLE XIV.

Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl.
None.	—	—	·365	·27375	·09125	+
None.	—	—	·34675	·2555	·09125	+
HCl.	℥ss.	¼ hr. before	·3285	·3285	0	—
HCl.	℥ss.	¼ „	·3285	·1025	·01825	+
HNO_3	℥ss.	¼ „	·31025	·292	·01825	+
Ac. Phos. Dil.	℥ss.	¼ „	·365	·3285	·0365	+
HCl.	℥j.	¼ „	·346	·273	·073 .	+
HCl.	℥j.	¼ „	·2555	·2555	0	—
HNO_3	℥j.	¼ „	·31025	·292	·01825	+
Ac. Phos. Dil.	℥j.	¼ „	·438	·365	·073	+
Ac. Phos. Dil.	℥j.	¼ „	·41975	·3285	·09125	+
HCl.	℥ss.	½ hr. after	—	—	—	—
HNO_3	℥ss.	½ „	·49275	·219	·27375	+
Ac. Phos. Dil.	℥ss.	½ „	·48362	·365	·11862	+
HCl.	℥j.	½ „	·6305	·2555	·375	+++
HNO_3	℥j.	½ „	·85775	·27385	·5849	+
Ac. Phos. Dil.	℥j.	½ „	·4745	·38325	·09125	+

It is evident from these tables that while both HCl and HNO_3 diminish the amount of the total acidity if given before meals, they especially diminish that of the free acidity which, in this case, was always inorganic acid. The same acids given after meals increase the acidity materially. Dilute phosphoric acid, on the other hand, increases both the total and the free acidity whether given before or after meals.

In the last series of observations made on this patient I used bicarbonate of soda in a solution of which one drachm contained 10 grs. of the drug. As this salt has been used so frequently by other experimenters, I deemed it unnecessary to do more than simply corroborate their results if possible.

I therefore gave the bicarbonate of soda in an exactly similar manner to that in which the acids were administered, the stomach contents, as before, being removed an hour and a half after the meal.

TABLE XV.

Date.	Drug.	Dose.	Time.	Total Acidity.	Combined Acidity.	Free Acidity.	Free HCl
Dec.	$NaHCO_3$	20 gr.	1 hr. bef.	·365	·31025	·05475	+
„	„	40 gr.	1 hr. „	·438	·4015	·0365	+
„	„	20 gr.	½ hr. „	·4015	·34675	·05475	+
„	„	40 gr.	½ hr. „	·41975	·365	·05475	+
„	„	20 gr.	With food.	·219	·219	0	—
„	„	40 gr.	„ „	·31025	·31025	0	—
„	„	20 gr.	½ hr. after	·31025	·31025	0	—
„	„	40 gr.	½ hr. after	·1095	·1095	0	—

Lemoine and Linossier's results are therefore corroborated, the alkali given before food raising the acidity above the normal, the alkali given with and after food not lowering the acidity as much as might be expected. If the figures obtained in this series when the alkali was given before food be compared with those of the HCl series a striking difference is brought out. With ʒss. of HCl ½ hour before food the total acidity was ·3285 per cent., free acidity ·01825 per cent. With 20 grs. of $NaHCO_3$ at that time the total acidity reached ·4015 per cent., the free acidity ·05475 per cent. If ʒj. of HCl was given the total acidity was ·346 per cent., the free acidity ·073 per cent., while grs. 40 of $NaHCO_3$ raised the total acidity to ·41975 per cent. with ·0365 per cent. of free acid.

Even when these two drugs were given with the food, although their reaction is so dissimilar, yet the acidity afterwards varied very little; for instance, after ʒj. of the HCl was given with the food the total acidity reached ·27375 per cent. and ·31 per cent., while with 20 grs. of $NaHCO_3$ similarly given the acidity was ·219 per cent., with 40 grs. ·31025 per cent.

It was only when these drugs were given after meals that great

differences in the acidities observed appeared. So after ʒj. HCl the total acidity rose to ·6305 per cent., while after 40 grs. $NaHCO_3$ it fell to ·1095 per cent, the free acidities being ·375 per cent. and *nil* respectively.

Consideration of the Results of the Inquiry into the Action of Acids and Alkalies on the Gastric Secretion, and of some other Drugs on the same Secretion.

Not only were the drugs tested by administration to a patient with a normal digestion, but they were also given to patients suffering from a variety of gastric disturbances. Hitherto nearly all the recorded observations on the altered chemistry of the gastric secretions after the exhibition of drugs have been performed on persons with a sound digestion. Any records, therefore, of the changes observed in the secretions of a diseased stomach are valuable.

A. $NaHCO_3$.—I hardly need add to the remarks which I have already made with regard to the action of sodium bicarbonate before food. In the first case on which I tried it, a case of dilated stomach with hyperacidity, the acidity was little influenced even by large doses. In the last case the acidity was indubitably raised. The presence of an alkali in the stomach spurs on the acid-secreting cells first to neutralise and then to drown the alkali in an excess of acid.

B. HCl.—Dilute hydrochloric acid, on the other hand, has the opposite action.

And not only do these results occur in normal digestion, but in impaired digestion also. The effect, however, of this drug was very slight in the case of cancer of the stomach experimented on, and in the patient suffering from a chronic gastritis, although in this last case the effect was more decided than in the cancer patient.

We may conclude, then, that alkalies do increase and acids decrease the gastric acidity if given before food.

On turning to the results obtained by the administration of acids after food, a difference may be at once noted between the cases in which digestion was ill performed and those in which it was normal.

In the case of the man with a dilated stomach even 240 ♏ of dilute HCl failed to raise the acidity above the ordinary acidity without the addition of drugs, although the free acid was much increased.

In the cancer case the acidity rose slightly under these circumstances, while in the patient with a chronic gastritis the acidity doubled itself and free HCl appeared.

In the gastrostomy case, on the other hand, administration of HCl, HNO_3 or H_3PO_4 after food increased the acidity to ·6 and ·8 per cent., and that without discomfort to the patient.

This point is worth noting. In the case of the man with a dilated stomach and of a nervous temperament, a total acidity of ·2555 per cent. with a trace of free HCl gave rise to some discomfort, while ·2628 per cent., with free HCl decidedly present, caused considerable pain. In the girl with the normal digestion an acidity of ·60225 per cent. with ·2 per cent. of free HCl gave her not the slightest inconvenience. The terminal branches of the pneumogastric nerve were in the first case unduly sensitive to the action of acids, in the second they were healthy and were not irritable. In the first case part of the disease may have originated with this intolerance leading to fermentation, the formation of gases and consequent dilatation. Treatment with hydrochloric acid given in moderate doses either before or after meals relieved the symptoms very considerably. The administration of antiseptics internally had little beneficial effect.

Acids when given with the food had not nearly so great an influence in increasing the acidity as when they were given after the meal.

The relative powers of HCl, HNO_3, and H_3PO_4 when given to a patient with a healthy digestion are not dissimilar. The results obtained have been already tabulated in Table XIV.

C. NH_4Cl.—Consideration of the facts ascertained as to the action of NH_4Cl would lead me to ascribe to it a power of increasing the gastric acidity. The reason why it should do so is not clear. In some people, as is well known, this salt has a marked effect on any dyspeptic symptoms from which they may be suffering. On the other hand the reputed value in liver disorders may be due more to the increased secretion in the stomach than to any special and local action on that organ.

I imagine that it would be a good drug to exhibit in cases of dilated stomach with fermentation, in which treatment with HCl has failed to reduce the violence of the symptoms. In one case of dilated stomach on which I tried it recently the good effect was only transient. In another case, however, of dyspepsia with diminished secretion of HCl and consequent fermentation, 15 grs. before each meal worked remarkably well.

None of the other drugs exhibited were tried for a sufficient space of time to give positive results.

D. NaCl.—NaCl when given before and after food had little effect on the acidity. A slight increase was generally observable.

E. H_2O.—Dilution of the food with warm water appears to lessen the secretion of HCl. Given before or after food it has little effect on the secretion.

F. Mastication.—As was to be expected mastication of the food introduced into the stomach, or of other food in the mouth while the usual meal was being given, raised the acidity very considerably.

And in connexion with this I may add that the patient on

whom gastrostomy had been performed only gained 1 lb. per week at first when fed by the wound, but afterwards when she was made to masticate some of her food beforehand she gained as a rule 5 to 6 lbs. in the same time.

Intestinal Secretions.

So far I have only considered the effect which these drugs have on the gastric secretion. It is almost impossible directly to investigate the changes produced in the intestines. If the same law holds good for the cells of the pancreas as for those of the stomach, the more acid the food the greater will be the activity of the alkali secreting cells. If alkalies, therefore, increase the gastric acidity when given at certain times, they will also excite the pancreatic secretion in its turn. Lowering of the gastric acidity with large doses of alkali after food will decrease the flow from the pancreas. The converse results in the stomach from the administration of acids will be followed by converse results in the duodenum.

Acids, therefore, given before meals by decreasing both secretions will not favour fermentation in the intestines. Given after meals the increased flow of alkali into the duodenum will promote the acid fermentation found to be present in the smaller intestine, which in turn will prove detrimental to the growth of the ordinary putrefactive bacilli.

If this hypothesis be true, therefore, acids should be given before food, alkalies after, for ordinary intestinal flatulence.

The administration of an alkali before food increases the secretion of HCl in the stomach, the secretion of $NaCO_3$ in the pancreas, and the amount of acid fermentation in the lower parts of the small intestine. Given after food the converse occurs.

In several of the cases I estimated the acidity of a sample of urine passed at the time the contents of the stomach were withdrawn.

A remarkable sameness was observed in all the cases. If the acidity of the stomach contents in one case was high, that of the urine was low, and *vice versâ*. But not only that—on several instances where the action of the drug had raised the acidity of the stomach, that of the urine fell, and again the converse held true on occasion.

Case.	Total Acidity. Stomach. Per cent.	Total Acidity. Urine. Per cent.
I.	·54	·154
I.	·1314	·456
II.	·2992	·0328
III.	·0547	·474
IV.	·146	·1095
V.	·1825	·1095

The old observation that during the digestion of a meal the

acidity of the urine diminishes is only applicable to healthy digestions. A patient with a chronic dyspepsia or a cancer of the stomach passes urine after a meal of almost as great an acidity as before, because his stomach secretes so little acid.

If one is unable to procure a sample of the stomach contents in a doubtful case, it is possible by testing the urine passed after—an hour and a half to two hours after—a reasonable meal to ascertain roughly the acidity of the gastric contents. If the acidity of the urine is below ·1 per cent., the amount of HCl secreted for digestion is very considerable. With an acidity of from ·1 to ·25 per cent. in the urine the acidity of the gastric contents is probably very similar; while if the acidity of the urine is above ·3 per cent., the HCl secreted by the stomach cells is almost certainly deficient.

These observations are possible only when the patient is taking no drug of a nature to affect the secretion of the urine, where the acidity of the urine is tested at the same time after passing on each occasion, and when the same amount of fluid is ingested daily.

The exhibition of large doses of other acids than HCl, although it may not increase the total acidity if given before meals, opens up the question,—Of what acid is the acidity made up of in such cases, and how much of it consists of HCl? Or, in other words, when any deductions are made from the results obtained by giving HNO_3, for instance, in large doses, in how far are these deductions to go in assuming a diminished or increased action of the secretory glands of the stomach? And again, Is the acid given *per se* an aid to digestion? The first part of this subject opens up too large a field of inquiry for me to enter upon at present, but from a few estimations of the chlorine which I made in one or two of the samples obtained from the gastrostomy case while giving H_3PO_4 both before and after meals, I should say that the secretion of HCl was diminished on all such occasions. The chlorine, the total—fixed, free, and combined—was estimated after the method of Hayem and Winter.

TABLE XVI.

Drug.	Dose.	Time.	Total Acid.	Combined Acid.	Free Acid.	Free HCl.	Total Cl.	Combined Cl.	Free Cl.	Fixed Cl.
H_3PO_4 Dil.	3j.	With meal.	·365	·365	0	—	·4574	·3214	—	·136
"	"	½ hour after.	·4745	·38325	·09125	+	·486	·3406	·0286	·1168
"	"	½ hour before.	·41975	·3285	·09125	+	·486	·2432	·126	·1168
"	"	½ hour after.	·5657	·3832	·1825	+	·418	·2914	·049	·0776

The acidities and the chlorine are both calculated in terms of HCl per cent. The chlorine figures, it will be observed, do not follow those representing the acidities. The total chlorine is naturally, seeing that it comprises the inorganic Cl, greater than the total acidity in most cases. The other amounts, however, are,

as a rule, less. The free HCl, however, on one occasion is ·03 per cent. more than the free acidity, probably due to an error in working.

The administration of acids other than HCl, then, even when they increase the acidity of the gastric contents, really diminish the output of HCl. That is to say, that the cells which secrete the HCl are influenced by the acidity of other acids, though probably not so acutely as that of HCl itself.

I have already noted this fact with regard to nitro-hydrochloric acid in artificial digestions in *The Medical Press and Circular*, March 1893.

Dr Allan Jamieson congratulated Dr Gillespie on his admirable and scientific paper. He mentioned a case where a gentleman who had consulted him for pruritus ani, but who had also suffered long from chronic gastric catarrh, told him that he could not take acids as medicines in any form, but could and did take chloride of ammonium with great advantage. The action of chloride of ammonium, as of the chlorides generally, was believed to be that of rendering the gastric mucus more liquid; it might thus free the peptic glands. At the same time chloride of ammonium is a nervine stimulant, as seen by its action in relieving migraine and trigeminal neuralgia. Had Dr Gillespie made any observations on the effect of sulphurous acid in cases of cancer of the pylorus? This in teaspoonful doses three times a day had done more, in Dr Jamieson's experience, to relieve the fermentation from retention than either sulphocarbolate of soda or hyposulphite of soda.

Mr A. G. Miller explained how he happened to suggest to Dr Gillespie experimenting with ammonium chloride, and stated that he was very glad to know that the drug had been found useful.

Dr T. Burn-Murdoch thanked Dr Gillespie for his very interesting paper, and expressed his appreciation of its importance and utility to practitioners. He stated that from experience gained in practice, alkalies had proved, with him, to be by far the most useful drugs in the treatment of dyspepsia. This experience, gained empirically, had now been explained scientifically by Dr Gillespie's researches. He asked Dr Gillespie if he had made experiments with any of the various pepsines in the market, as he had found them practically valueless in treating dyspepsia. He also asked if Dr Gillespie had, in the case of gastrostomy experimented upon, been able to verify the statements made by Beaumont, in the case of Alexis St Martin, upon the effects of normal digestion on various foods.

Dr Taylor said,—In case you should think, Sir, or that Dr Burn-Murdoch should think, that the "hear, hear" uttered by me when he was speaking of the uselessness of preparations of pepsin was ironical, I wish to assure you that it was perfectly sincere, and that I think it is high time that we had abandoned the use of the dry

bones, so to speak, of defunct animals, when we have each within springs of fresh pepsin to draw upon which can be made available by the use of wholesome and scientific stimuli, the administration of which has been so well treated of in Dr Gillespie's paper. It is gratifying to see that Dr Gillespie has come round to the opinion on which much of our practice has been based for many years,—namely, the antagonistic action of the stomach toward either acids or alkalies; and which opinion, at the time of reading his former paper, he was inclined to regard as being without sufficient foundation. If the scepticism then expressed has led up to the inquiry which has found expression in the present paper, it has had a very happy result; for it is always gratifying to find that the preconceived notions founded upon induction and observation, and justified by practice, are true, and are capable of scientific verification. The constant inverse ratio of the degree of acidity present in the stomach and the urine is to me an observation of great interest. It seems as if the stomach had the power of calling up when necessary the resources of the blood required for its use, and leaving the urine and other secretions and the blood itself so far deficient in them, and it would be useful if Dr Gillespie could devise a ready method of ascertaining the *degree* of acidity in the urine, as we might be thereby enabled to arrive at approximate conclusions regarding the state of the stomach and of the blood so far as acidity or alkalinity are concerned. Dr Gillespie has spoken of the very large doses of acid which can be administered without injury; and I would wish to remark, for the benefit of Dr Craig, that very much larger doses of alkali can be tolerated than what he and other therapeutists give a warrant for in their posological tables. This is especially true of bicarbonate of soda, with regard to which there is an impression abroad that it is injurious in larger doses than 10 or 20 grains, and dispensers are apt to correct us if we administer more. In my experience these doses are next to useless, and especially in gouty and rheumatic cases ten times that quantity can be taken with advantage. I know a gentleman who suffered from painful dyspepsia, and who was seized with paroxysms of pain so severe that he could not stand, but writhed in agony face downwards on the sofa or floor, and whose means and inclinations placed within his reach for many months the best medical skill far and near. Well, after going through a list of pharmacopœic extent, the panacea was found to be bicarbonate of soda, and this he continued to take for years, always with infallible relief, but in what doses? I have seen him after dinner go to the sideboard, where the soda was always in readiness, and take a small tablespoonful and swallow it dry. This he did for years before his death, whenever the pain came on; and notwithstanding the hundredweights he must have swallowed, no concretions or other mischief were found in his intestines when he died. This case opened my eyes to the benefit and harmlessness of large doses of soda.

Dr James Ritchie felt indebted to Dr Lockhart Gillespie for having done so much to help to place on a scientific basis the principles which had for a length of time guided many men in their treatment of indigestions. As the cause of acidity varied, so it was necessary to vary the treatment, and if alkalies were used, the time at which they were administered. In irritable conditions of the stomach with hypersecretion, they should be given immediately before food, and in such conditions the leisurely and thorough mastication of food, by increasing the flow of saliva, prolonged the time during which the amylaceous portions of food might undergo digestive changes in the stomach. He wished to state that he strongly objected to any routine use of mincing machines, purées, and other means whereby patients were prevented from using their own masticating apparatus, and thus lost the benefits of the reflex results of mastication. If the masticating apparatus were defective, the dentist's aid should be invoked, not that of a mincer. In atonic dyspepsia, alkalies should be given an hour before meals, and if this were not sufficient, acids after meals also. Dr Gillespie's experiments had proved the wisdom of giving, in such cases, little fluid with meals. In these the giving of fluid, with or without an alkali, according to conditions, three hours after a meal, when the gastric digestion should be completed, was beneficial both in flushing the stomach so as to permit it to start on the next meal with clear decks, also in supplying fluid to the system for the removal of waste products. The *amount* of alkali should be regulated by the constitution. Gouty, and especially rheumatic people, might take with advantage doses which would be prejudicial to some others. As to the *kind* of alkali, Dr Bramwell had favoured potash; but although the taste of soda was more objectionable it was less lowering, and was less prejudicial to the coloured corpuscles of the blood. Some speakers had objected to peptonising agents. Many of them were useless. Those which were active had only a limited place in treatment. He thought that if sufficient care were bestowed upon the regulation of the kind of food, its amount, the frequency of meals, or rather in many cases making them less frequent, and the chemistry of the digestive process in individual cases, there would be less need for peptonising agents.

The President thanked Dr Gillespie in the name of the Society for his admirable paper, which had evidently excited a keen interest, and had a high practical value. He directed Dr Gillespie's attention to the experiments of Roy and Sherrington on the effects of acids and alkalies on the nervous centres, and suggested their possible action on the plexus of nerve ganglia surrounding the stomach, and the relationship of those ganglia to its muscular action, to the vaso-motor condition of its mucous membrane, and to the gastric juice secretions.

Dr Gillespie, in reply, thanked the Society for their attention

during a rather long and technical paper, and said that it was not intended to introduce any new subject, but to place on as scientific a basis as possible facts which were known empirically to most. He agreed with Dr Burn-Murdoch that pepsin preparations, unless when made up with dilute hydrochloric acid, were of no value, except in a very few cases of dyspepsia, although peptonised foods—quite another matter—were often of the utmost service. In cases of cancer or of atonic dyspepsias with fermentation, he thought that, as the cause of the fermentation was the small amount of HCl secreted, the addition of that acid was preferable to any artificial antiseptic such as creasote, which had only a local and temporary effect, while the acid if given for some time often helped to cure the condition.

2. SOME NOTES ON SURGICAL ECONOMY IN HOSPITALS.

By ARTHUR NEVE, M.D., F.R.C.S. Ed., M.R.C.S. Eng., Kashmir, India.
Communicated by Mr CATHCART.

IT will be freely acknowledged that in hospitals economy is secondary to efficiency; and, indeed, that efficiency is essential to true economy. But efficiency may be, and often is, combined with waste and extravagance. If surgeons of British hospitals had to raise and administer the funds as well as care for the patients in their surgical wards, I venture to think they would study both sides of the question, as the surgeons of the Kashmir Mission Hospital have to do.

The cost of dressings has enormously increased with the introduction of antiseptic surgery. Dr Joseph Bell has pointed out, that while in 1854 the surgical dressings, etc, in the Edinburgh Royal Infirmary cost £286, in 1891 they cost £2821, "an altogether astounding increase in expense."

For the sake of comparison I tabulate the statistics of the Kashmir Mission Hospital alongside those of the Edinburgh Royal Infirmary for 1891–92 :—

	E. R. I.	K. M. M.
Total operations, . .	2171	2198
In-patients, . . .	4360	619
Average residence, . .	25 days.	18 days.
Cost per patient, . .	£4 7 3½	£0 7 8
Surgical dressings, bandages, etc., . . .	£2821 0 0	about £17 0 0
Mortality, . . .	119	8

It will be at once noticed that a very large number of our operation cases are treated as out-patients. The explanation that such were minor operations would not be altogether correct. The Hospital suburb is always full of our patients, many of whom have

religious or social prejudices against becoming in-patients. Four or five cases on whom major operations have been performed are daily brought as out-patients. Apart from the *eye* operations, which bulk so largely (881 cases), about 650 might be reckoned as major operations.

The difference between the cost of the average Scottish and Kashmiri patient is, of course, mainly due to the cheapness of food and the low rate of wages in this country, where rice can be bought for ½d. per lb., so that £2, 10s. a year would feed an adult Kashmiri. For the same reason wages are low, and the total cost of our seventeen dressers and servants is only £100.

On the other hand, the bedsteads, blankets, sheets, and surgical dressings have to be procured from England, with the extra expense of 5000 miles of sea and 1500 miles of land carriage. Obviously, if we used the same surgical dressing materials in the same proportions as in Scotland, the cost of dressings for the Kashmiri patient would be greater than for the Scottish patient, amounting certainly to not less than £500 instead of the humble £17.

The expense of our surgical dressings may be thus analyzed:—

Bandage cloth, 800 yards, costing £6, 13s. This represents about 2500 bandages, most of which are washed twice, and so represent about 7500 bandages. As we apply not less than 10,000 dressings a year, it appears that the same bandages are sometimes re-applied. The cost of washing them is about £2 a year. If new bandages were each time used, the total cost would be at least three times as great. Bandages from special cases, such as gangrene, erysipelas, or leprosy, are all burnt.

Muslin, for the sawdust pads, of which I give further details below, costs, with the making up, about £4. This makes about 2000 pads, which are rewashed like the bandages.

Cedar sawdust costs about 6d. per cwt. if it has to be bought, but we preserve the sawdust of our own timber used in building. Probably 6 or 8 cwt. of sawdust serves us for the year.

Cotton wool costs about 3d. per lb., and of the local product we use about 100 lbs. for various purposes.

The chief remaining items of expense would be salalembroth wool, about 20 lbs., and a few packets of cyanide gauze; also a few pounds of surgical lint, with the usual et ceteras—protective, macintosh, etc.

The chief requisites in a surgical dressing are that it should be aseptic, antiseptic, absorbent, comfortable, cheap, and easily applied. Of late years salalembroth cotton wool and wood-wool have become the popular and staple hospital dressings, and it may be readily acknowledged that they fulfil satisfactorily most of the chief indications except that of cheapness. Sir J. Lister has pointed out the drawbacks to corrosive sublimate deep dressings; the readiness with which serous discharge neutralizes the antiseptic properties; the over-solubility leading to the mercury being

washed out, or to irritation of the skin. For these reasons the cyanide of mercury gauze, which is soft and very absorbent, as well as antiseptically stable, will grow in popularity. But all these materials are expensive. Where, as in the reception of discharges from suppurating joints, or diseased bone, or psoas abscesses, antiseptic and absorbent dressings are needed in bulk, the cost of each dressing is considerable.

If we were to replace all our antiseptic sawdust pads by salalem-broth wool, the cost would be about £75 per annum, instead of £4, 10s. The pads are a most efficient and easily applied dressing. Muslin somewhat close in texture, to avoid the sawdust dusting through, is made into bags from 4 or 6 to 12 inches square. These bags are soaked in corrosive sublimate lotion, and dried. Cedar-wood sawdust (or pine sawdust) is also moistened with the lotion and dried. With this the bags are loosely filled, so as, when laid flat, to be from ¾ inch to 1½ inch thick, according to the size of the bag. In applying them we frequently moisten the deeper layer with carbolic lotion.

The pads are admirably suited for use with the zinco-cyanide of mercury. A given quantity of the mercury is stirred into some 1-20 carbolic in a tray, a few drops of aniline dye are added, and the bags are then placed flat in the tray. The sawdust in the bags should not have been medicated previously. The prepared pads may be placed to dry in a special box, or used fresh in their moist condition. It is not necessary to soak the whole bag. The dye shows which is the prepared surface.

Of course these pads can be used, and are indeed usually used, with other materials. For example, if a tumour has been excised and the wound sutured, we then apply two or three folds of cyanide lint (prepared as suggested by Lister), and cover the wound with a prepared cyanide pad. If there were oozing, the pad would, if necessary, absorb 8 or 10 ounces of discharge; and the evenly adjusted pressure of the bag is useful, acting almost like a splint. In dressing an amputation wound the pads would be used below, where most of the discharge will gravitate, while above absorbent wool would be used. For special cases, such as psoas abscesses with abundant discharge, extra large bags are easily provided; and for some cases similar bags, two feet square, are laid in the bed to protect the sheets.

The pads have less drying properties than absorbent wool, which sometimes dries in such a way as to form a crust, under which the discharge is pent up. This never occurs in the pads. The discharge is so uniformly absorbed that usually not a drop of matter will escape to the surface or edge until the entire sawdust is soaked. Here, again, they are superior to absorbent wool, which frequently allows even a small amount of discharge to penetrate directly to the surface instead of diffusing itself. Both the muslin of the bags and the bandages are boiled, washed, and used again.

After coming from the wash they are soaked for forty-eight hours in corrosive sublimate lotion, so that there is no risk of sepsis.

These bags are used by us in padding many kinds of splints, especially for Macintyre splints. When once the preparation and use of the bags has become a matter of routine, one finds them *more convenient* than any other dressing for most operation cases.

During the last few weeks, with several hundred operation cases from ovariotomy, hernia, lithotomy, and amputations, to scrapings of ulcers or incisions of abscesses, I do not recall a single case (except eye operations and a few minors) in which bags were not used.

The two following cases may serve as examples of the application of zinco-cyanide sawdust pads:—

A. G., acute suppurative periostitis of femur; operation, August 5, 1893, drained and irrigated; two-thirds of femur bare, and disease is of thirty days' duration, so necrosis seems probable. Applied two pads, and covered with mackintosh. Wound dressed August 6th, 9th, 11th, 14th, 17th; dismissed cured August 21st. In this case there was abundant discharge, at first soaking both bags, but it rapidly ceased. Altogether fourteen bags were used, at a total cost of less than 6d. With wood-wool dressings this case would have cost at least six shillings.

M. D., carcinoma of foot; amputation of upper third of leg; dressed August 11th, 14th, 16th, 20th. Altogether six bags were used, a few strips, perhaps half a yard, of (locally prepared) zinco-cyanide lint, and ½ lb. of locally prepared absorbent cotton wool; so that the total cost, including six bandages, six pads of lint, and absorbent cotton wool, did not exceed one shilling.

I have at different times made experiments with the pads prepared in various ways, and then soaked with blood or serum and kept in a warm, moist place. They have been kept for periods up to ten days, re-moistening after a few days, and inoculating with septic pus, but without septic odour; and even blood-clots mixed with the sawdust become dessicated aseptically. These experiments require bacteriological confirmation by cultivation tests, but they agree with the results of clinical observation.

Cotton wool, in the ordinary commercial forms, here costs 3d. a pound; but before being suitable for use, except merely as a padding, it requires to be rendered absorbent. I should like to know a simple way of accomplishing this. After trying various plans, I now merely have it boiled with various alkaline ingredients and soap by the washerman, after which it is carded. It will not sink in water if a pledget is dropped on the surface; but it is suitable for artificial sponges, and if bandaged on a discharging wound absorbs the discharge fairly well.

The dressing of all in-patients is invariably directed by Dr E. F. Neve or myself, and the assistants are taught to re-use any

unsoiled portions of the old dressings in the outer dressings. Perhaps this may seem over-economy; but in careful hands, with a knowledge of antiseptic surgery, it is safe.

It would be foreign to my present purpose to go into the subject of simple and readily adjustable forms of splints, although such are a real economy; and it is important that young practitioners should be familiarized with the use of easily obtainable and cheap appliances. We find wooden laths and hoop-iron useful, as they can be readily cut and bent to required shapes. But we also use to a large extent bracketed splints of local manufacture. A Kashmiri-made Macintyre splint costing five shillings is almost indistinguishable from the English article.

3. *Dr Dawson Turner* read the following NOTES ON THE PHYSICS OF AN ANEURISM:—

The most important law as regards the pressure of fluids is known as Pascal's,—*i.e.*, the equal transmissibility of fluid pressure. When pressure is communicated to a fluid it is transmitted equally in all directions through the fluid; the Bramah press depends upon this principle, because the pressure upon any area varies directly as that area,—the greater the area, the greater the pressure; if the area be a hundredfold greater, the fluid pressure upon that area will be a hundred times greater. This law, and its application to the case of an aneurism, we are all well acquainted with. If, however, we study the matter from a hydrokinetic point of view, we find that other factors must be taken into account. The case of an aneurism may be taken to be that of a fluid moving under a certain pressure through a tube of varying diameter,—moving from a tube of small sectional area into a tube of greater sectional area, and then on into a tube of small sectional area again. Experiment shows us, in this case, that the fluid pressure per unit area is actually greater in the larger tube than in the smaller one; this is because the velocity of the stream is less, and in the case of a constant steady flow, "where the velocity is greatest, there the pressure is least." A particle of fluid entering the wider part of the tube finds a greater pressure in front of it resisting its advance, than behind it urging it on. The fluid pressure on unit area, then, in an aneurism is actually greater than it is in the bloodvessel on either side of it; and it is this point that I desired to bring before the Society's notice, and that ought to be taken account of in investigating the causes of the gradual distention of aneurisms.

I have had this model constructed to illustrate these points. A number of manometers are fixed at certain distances apart in this tube; they will serve to measure the fluid pressure upon the sides of the tube. At one point the tube has a wide dilatation (to represent an aneurism). By means of the vessel that the boy will raise I can cause water to flow under a certain pressure through the tube, and it will now be observed that the water will

stand highest in the manometer which is fixed in the dilated portion. Allowance must be made for the effect of friction in lowering the pressure as the water passes along the tube, for if the tubes were of uniform sectional area, each manometer would stand at a lower level than the preceding one. Another effect of an aneurism is to dam the blood back, and *to increase* the work of the heart, while it diminishes the general blood-pressure beyond it; thus it may lead to dilatation of the heart and incompetence of the valves in consequence of the strain to which they are subjected. Some surgeons are inclined to regard an aneurism as a safety valve; I hesitate to take that view, because I think that an aneurism, instead of diminishing, decidedly increases the labour the heart has in maintaining the circulation.

4. CASE OF RECURRENT FIBRINOUS RHINITIS.

By THOMAS M. BURN-MURDOCH, M.B., C.M., Lecturer on Diseases of Children, Edinburgh School of Medicine.

A. R. U., female, aged 33.

Previous History.—The patient enjoyed good health, with the exception of severe attacks of migraine. In the summer of 1885, fully four years before the attack about to be described, she had her first attack of hay fever, and in each subsequent year has suffered from it in an increasingly severe form.

History of First Attack of Fibrinous Rhinitis.—This commenced on November 18th, 1889, with a slight cold in the head, which rapidly became very severe. In four days the nostrils were completely closed down to their orifices.

A continuous discharge of muco-gelatinous secretion necessitated the constant application of towels to the nose by night and day. The nose itself became swollen and painful. Speech was indistinct and difficult.

On the sixth day white membranes were observed to protrude from the nostrils. They were tough, and came away in casts about the size of half the shell of a boiled bean, which they resembled in shape, but were not so opaque. They could be seen adhering to the mucous membrane of the inferior turbinated bones. Large quantities of them were cast off daily.

The running from nostrils and general discomfort was such that reading or any work was prevented. Blowing of the nose was impossible, as the passages were completely blocked.

The whole appearance of patient's face was altered. The nose became much swollen, and seemed to rise out of the forehead and cheeks, and project in a short cone.

Slight erythema was noticed on the cheeks.

In a week's time the running had nearly ceased; occasionally opening of the nostrils by blowing was possible, but they remained,

in general, closed for three or four days more. The whole attack lasted about a fortnight.

Frequent attacks of severe sneezing accompanied the malady, preceded by tickling in the back of the throat.

There was no rise of temperature.

Till the second attack the throat remained irritable. There was persistent cough and frequent sneezing, but no actual cold in the head.

About a week previous to this attack, the fauces and larynx had been examined one evening in the usual manner. Whether owing to this or not, the left half of the tongue swelled largely during the same night, so that by morning it was very difficult to articulate. The condition was suggestive of an effusion of blood, and I thought I should have to incise it. The swelling, however, subsided quickly in the morning.

Second Attack commenced on February 15th, 1890, in a manner almost similar to the first. The running from nostrils was even more severe. Towels had again to be employed.

Corrosive wool put into the nostrils afforded some relief; when removed, the membranes adhered to it, appearing as if they had grown into the wool.

The nose and cheeks were considerably swollen, and became hot, red, and painful. The uvula swelled, and the throat felt hard and dry.

Breathing was difficult, and the general discomfort intense.

Hot bathing, iodoform, menthol, fluid vaseline, and cocaine afforded no real relief.

Morphia and aconite in small doses checked the discharge a little. Towards the end of the attack, when the nostrils were opening, cocaine also somewhat checked the running. The membranes practically ceased at the end of first week, but after the nose had become clear for a day or two the muco-gelatinous discharge and closing of the nostrils commenced again, and became as troublesome as at the commencement.

The whole attack lasted a fortnight.

A feeling of great irritation of the skin generally accompanied this attack, and towards its termination some dark-coloured spots were noticed down all the front of the left thigh. Some ran into each other. These persisted for several days. They resembled purpurpic spots.

Quinine and iron were given during attack.

Third Attack commenced on the evening of April 17th, 1890, after travelling from London to Edinburgh.

A slight sensation, as of a cold in the head coming on, accompanied it. During the greater part of the journey the patient felt chilly, and suffered from cold feet. Next day (18th) she had a cold in the head, with running of nostrils and sneezing. On third day (19th) cold was aggravated. Uvula was œdematous, and nose

slightly swollen by the evening. During the night the nose ran freely, and the pillows were stained with muco-gelatinous discharge, as on former occasions. Towels had to be used. The patient passed a miserable night on account of the nasal obstruction, throat swelling, and pain in nose, which by next morning (20th) was much swollen, and the whole appearance of the face was again entirely changed. Some fibrinous membrane became detached from the left nostril.

On *April 21st,* nose more swollen, felt pulsating; frontal headache; was accompanied by profuse discharge. Numerous well-defined casts were thrown off from both nostrils. The temperature, though frequently taken, remained normal.

April 22nd.—Face was very swollen; eyes puffy, and lids œdematous. There was sneezing, with much discharge, and frequent casts.

April 23rd.—Membranes stopped during night. Skin over cheeks and lips tender and indurated. During evening swelling of eyes and nose recurred, and fresh membrane formed in the right nostril.

April 24th.—Breathing was much impaired by swelling of throat and pronounced œdema of throat and uvula. The nose was completely blocked. The right eye became suffused. In the evening the skin over back and front of body, arms, hands, and legs grew very irritable. The least rubbing produced a red blush.

April 25th.—During the night a large ovoid hard swelling occurred in the right half of the tongue, which by morning was much swollen and painful, rendering speech and deglutition difficult. It subsided entirely during the day. A spatula had been used gently the day before to depress the tongue during examination of throat. Throughout the 25th the skin irritation diminished. Face and nose were less swollen; smell and taste commenced to return.

Improvement now gradually progressed, with the exception of a slight relapse on 28th; but sneezing, pricking of the throat, and more or less complete obstruction of the nostrils remained persistent.

Fourth Attack commenced on May 26th, 1890, and lasted for fully a week. The symptoms, including the discharge of membranes, were similar to, but not so severe as, those formerly described.

Fifth Attack commenced on November 13, 1890, and lasted eight days. It was like the fourth in not being of so severe a type as the earlier ones.

Subsequent History.—During the summer of 1890 and spring of 1891 the throat and nose remained irritable. Hay fever occurred as usual, but in an aggravated form.

In June 1891 Dr M'Bride examined her, and after carefully

searching the mucous membrane of the nostrils for any specially irritable points, he cauterised them with the electro-cautery. Since this cauterisation no attack of fibrinous rhinitis has occurred (till a recent one a fortnight ago, about to be described), nor has the patient had a bad cold in the head. The spring and summer of 1892 were spent by the patient in bed on account of a severe illness, and it is interesting to note that no hay fever occurred.

In June 1893 patient suffered from a very bad attack of hay fever, which was confined *entirely* to the eyes, and which became so swollen that she was blind for several days.

On July 1st, 1894 (after this paper was written), having been exposed in the sun on a hot day in a meadow, an attack of hay fever commenced, which chiefly affected the throat and eyes.

Nose symptoms shortly developed, and the patient for the SIXTH TIME suffered from an attack of fibrinous rhinitis.

This closely resembled the former ones, a pronounced erythema with œdema of the eyelids and cheeks being very marked.

Membranes were shed on the evening of the 6th for the first time. They were not so numerous as on former occasions, and only appeared in the left nostril. Dr M'Bride saw them *in situ*, and verified their appearance.

This attack undoubtedly began as hay fever usually does, and the patient had no nose symptoms till the erythema of the cheeks spread to the nose. No rise of temperature was at any time detected. The attack ran the usual course, but left the nostrils, especially the left one, much blocked.

Convalescence was accompanied by constant irritation of the throat and nose and a continuous sero-mucous discharge from the nostrils. Dr M'Bride cauterised the mucous membrane of both the inferior turbinated bones on July 21st, since when decided improvement has set in.

PATHOLOGICAL REPORT BY W. F. ROBERTSON, M.B.

"The microscopic structure is of great interest, and very difficult to interpret. The membrane seems to be composed mainly of fibrin, containing numerous round cells, and is devoid of vessels. In addition there are epithelial cells so arranged as to make me inclined to think that at places the whole depth of the mucous membrane has been shed.

"Sections stained by Loffler's method show no bacilli or other organisms. Sections stained by Gram's method show a few groups of micrococci, which have no special significance."

The rarity of the case, the obscurity of its causation, and its intractability to treatment, have induced me to bring it before this Society.

INDEX.

Acids and alkalies, the action of, on the secretions of the body, by Dr A. Lockhart Gillespie, 234.

Acromegaly in a giantess, patient exhibited, 13.

Alkalies and acids, the action of, on the secretions of the body, by Dr A. Lockhart Gillespie, 234.

Anchylostoma duodenale, specimens exhibited, 15.

Aneurism of the aorta, specimen exhibited, 221; physics of, notes on, by Dr Dawson Turner, 267.

Annandale, Professor, original communication — intra-cranial surgery, 97; exhibits patient from whom tumour of the brain had been removed, 125.

Aorta, aneurism of, specimen exhibited, 221.

Appendicitis, removal of appendix vermiform for, two cases exhibited, 231.

Appendix vermiform, removal of, for acute appendicitis, two cases exhibited, 231.

Ataxia, Friedreich's, case of, exhibited, 2.

Bell, Dr Joseph, original communication—valedictory address, 3; exhibits two cartridges removed from the head of a boy, 232.

Bier's method, of amputation, cases exemplifying, exhibited, 2; of treating strumous diseases of the extremities by passive congestion, by Mr A. G. Miller, 19.

Bone, temporal, exhibited from a case of septic thrombosis, 18.

Bramwell, Dr Byrom, original communications—(1) a case of sporadic cretinism, 34; (2) cancer of the breasts, spleen, etc., 74; gives lantern demonstration of microscopic specimens from a case of syringomyelia, 223; exhibits patients—(1) three cases of pseudo-hypertrophic paralysis, 232; (2) a case of acromegaly in a giantess, 13; (3) a case of psoriasis treated by thyroid feeding, 31; (4) cases of lupus treated by thyroid feeding, 31, 33, 63, 175, and 232; (5) a case of ichthyosis under thyroid treatment, 176; exhibits drawings of a case of ichthyosis, 63.

Bruce, Dr Alexander, original communication—on syphilitic nodose periarteritis, 190; gives lantern demonstration of preparations from a case of syringomyelia, 223; exhibits—(1) specimens of anchylostoma duodenale, 15; (2) a cholesteatoma, 69; (3) microscopic specimens of anchylostoma, 15.

Bruce, King Robert the, cast of his skull exhibited, 232.

Burn-Murdoch, Dr T., original communication—case of recurrent fibrinous rhinitis, 268; exhibits a specimen of hyperkeratosis of the filiform papillæ of the tongue, 221; exhibits a cast of the skull of King Robert the Bruce, 232.

Caird, Mr F. M., original communication — on gastrostomy after the method of Witzel, 26; exhibits patients—(1) a case of Charcot's disease in both knees, 33; (2) two cases trephined for injury, 127; (3) two patients after recovery from tracheotomy for diphtheria, 180; (4) a case of gastrostomy illustrating method of Witzel, 13; (5) two cases exemplifying amputation of the leg after the method of Bier, 2; exhibits—(1) preparations illustrative of cerebral surgery, 161; (2) specimens illustrating tracheotomy and diphtheria, 180.

Calvarium, specimen exhibited, from a case of suicide by a hatchet, 69.
Cancer of the breasts, spleen, etc., communication on, by Dr Byrom Bramwell, 74; report on the microscopical condition of the organs in Dr Bramwell's case, by Dr Leith, 84.
Carcinoma of the throat, parts removed from, exhibited, 17.
Carmichael, Dr Edward, exhibits an aneurism of the aorta with rupture into the right ventricle, 221.
Carmichael, Dr James, exhibits patient treated by aspiration for pleuritis with purulent effusion, 220; exhibits temporal bone from case of septic thrombosis, 18.
Cartilages, semilunar, of the knee joint, displacements of, communication by Dr Logan Turner, 223; two cases exemplifying operation for, exhibited, 221.
Cartridges, two, removed from a boy's head, exhibited, 232.
Cathcart, Dr C. W., exhibits patients—(1) one who had been operated on for brain abscess, 125; (2) in whom the mastoid had been trephined, 125; (3) two cases of the removal of the vermiform appendix for acute appendicitis, 231.
Charcot's disease in both knees, case of, exhibited, 33.
Chiene, Professor John, exhibits a patient with unilateral enlargement of the bones of the face and anterior cranium, 231.
Cholesteatoma, a, exhibited, 69.
Clouston, Dr T. S., lantern demonstration of the microscopic pathological changes found in the brain and its membranes in insanity, 176.
Colon, intussusception of, patient operated on, exhibited, 175.
Congestion, passive, strumous diseases of the extremities, treated by, 19.
Cotterill, Dr J. M., exhibits patients operated on—(1) for genu valgum; (2) excision of tongue, 175; (3) excision of larynx, 175; (4) for intussusception of colon, 175; exhibits the parts removed from a case of carcinoma of the throat, 17; exhibits instruments for throwing down a large flap of bone from the cranium, retaining its connexion with skin and pericranium, 162.
Craig, Dr William, elected a member, 97.
Cranium, anterior unilateral enlargement of the bones of, and of face, patient exhibited, 231.
Cretinism, clinical remarks on a case of sporadic, by Dr Byrom Bramwell, 34; notes on a case of, by Dr John Thomson, 65.
Croom, Dr J. Halliday, original communication—massage, 202.
Cumming, Dr John, elected a member, 180.

Deformity, heredity of, cases exhibited, 33.
Demonstrations, lantern—(1) of the microscopic pathological changes found in the brain and its membranes in insanity, by the President, 176; (2) from cases of syringomyelia, 223; (3) on displacements of the semilunar cartilages of the knee joint, 223.
Diphtheria, tracheotomy for, cases exhibited, 180; specimens illustrating, exhibited, 180.
Discussion on intra-cranial surgery, 97; on massage, 202.
Dislocation, compound subastragaloid, of foot, case exhibited, 63.
Douglas, Dr C. E., elected a member, 220.
Dunlop, Dr J. C., exhibits three patients showing heredity deformity, 33.

Economy, surgical, in hospitals, by Dr A. Neve, 263.
Electricity, apparatus for static, exhibited, 62.
Elkins, Dr F. A. exhibits patients, three women suffering from general paralysis of the insane, 12.
Esmarch, Prof. von, of Kiel, elected an honorary member, 180.

Face and anterior cranium, unilateral enlargement of the bones of, 23.
Fibrinous rhinitis, recurrent, notes on a case of, by Dr Burn-Murdoch, 268.
Foot, compound subastragaloid dislocation of, case exhibited, 63.
Friedreich's ataxia, case of, exhibited, 2.

Gall-stone, specimen exhibited undergoing disintegration, 17.
Gastrotomy, case of, exhibited, 2.

Gastrostomy after method of Witzel, patient exhibited, 13; original communication, by Mr F. M. Caird, 26.
Genu valgum, patient operated on, exhibited, 1.
Giantess, acromegaly in a, patient exhibited, 13.
Gibson, Dr George A., exhibits a patient who had been trephined for subdural cysts, 126.
Gillespie, Dr A. Lockhart, original communication—the action of acids and alkalies on the secretions, 234.
Graham, Dr F. Maurice, elected a member, 63; exhibits—(1) patient, case of fracture of superior maxilla, 180; (2) specimen, a joint which had been excised, 180.

Head, bullet wound of, case of, by Dr A. T. Sloan, 45; photograph of a case of suicide by pistol-shot, 68.
Heart, ruptured, specimen exhibited, 16; fatty infiltration of, specimen exhibited, 17.
Heredity of deformity, cases exhibited, 33.
Hodsdon, Dr J. W., exhibits three specimens illustrating cranial surgery—two from cases of abscess, and one from sinus phlebitis, 164.
Hospitals, notes on surgical economy in, by Dr A. Neve, 263.
Hyperkeratosis of papillæ of tongue, specimen exhibited, 221.

Ichthyosis, cases of, exhibited, 63, 175.
Insane, general paralysis of, three cases exhibited, 12.
Intussusception of colon, patient exhibited who had been operated on, 175.
Iodine, note on the action of, by Dr Dawson Turner, 201.

James, Dr Alexander, exhibits patients—(1) case of Friedreich's ataxia, 2; (2) a patient operated on for epilepsy, 127.
Jamieson, Dr Allan, exhibits patients—(1) case of lupus erythematosus, 64; (2) case of lupus vulgaris erythematoides, 230; (3) case of lichen pilaris, *var.* spinulosus, 230; exhibits a soap of resorcin and salicylic acid, 223.
Johnston, Dr M'Kenzie, exhibits patient in whom drainage of the mastoid antrum was kept up by means of a lead canula, 126.
Joint, excised, exhibited, 180.

Ker, Dr Claude B., elected a member, 97.
Kidney, polycystic, specimen exhibited, 15.

Larynx, excision of, patient exhibited, 175; hyperkeratosis of papillæ of, specimen exhibited, 221.
Leith, Dr R. F. C., original communication—pathological report on a case of cancer of the breasts, spleen, etc., 84.
Lichen pilaris, *var.* spinluosus, case of, exhibited, 230.
Littlejohn, Dr Herbert, exhibits—(1) the calvarium from a case of suicide, 69; (2) a photograph of the head from a case of suicidal pistol wound, 68; (3) a revolver which had been used in a case of suicide, 68; (4) a hatchet which had been used in a case of suicide, 69.
Lupus treated by thyroid, cases exhibited, 31, 33, 63, 175, 230, 232; treated with tuberculin, photographs of cases exhibited, 34; vulgaris, commoner varieties of, and their treatment, by Dr Norman Walker, 180; vulgaris erythematoides, case exhibited, 230; erythematosus, case of, exhibited, 64.

M'Bride, Dr P., exhibits patient in whom Staphi's operation had been performed, 125.
MacGillivray, Dr C. W., exhibits patient who had been trephined and the lateral ventricles aspirated, 126.
Mackenzie, Dr James, elected a member, 63; original communication, on significance of venous pulse, 69.
Mackenzie, Dr Robert, elected a member, 1; exhibits thumb, 15.
Macpherson, Dr John, exhibits patient, a general paralytic who had been trephined, 126.
Massage as an adjuvant to medical, surgical, and gynæcological practice, by Dr J. Halliday Croom, 202; discussion on, 209.
Maxilla, superior, fracture of, case exhibited, 180.
Miles, Dr Alexander, exhibits a patient who had been operated on for Jacksonian epilepsy, 126.

Miller, Mr A. G., original communications—(1) note on Bier's method of treating strumous diseases of the extremities, 19; (2) on Dr Heron Watson's method of excising the wrist joint, 228; exhibits patients—(1) case of recovery after operation for septic sinus phlebitis of the lateral sinus, 230; (2) three cases of excision of the wrist by Watson's method, 221; exhibits a preparation from a fatal case of a temporo-sphenoidal abscess, 162.
Mowat, Dr James, elected a member, 12.
Muir, Dr Robert, elected a member, 180.

Nervous disease, a peculiar case of, exhibited by Sir Thomas Grainger Stewart, 2.
Neve, Dr, original communication—surgical economy in hospitals, 263.

Œsophagotomy, case of, exhibited, 2.
Office-bearers, election of, 1.

Paralysis, general, of the insane, three cases exhibited, 12; pseudo-hypertrophic, three cases exhibited, 232.
Periarteritis, syphilitic nodose, by Dr A. Bruce, 190.
Phlebitis of the lateral sinus, patient exhibited, 230.
Physics of an aneurism, notes on, by Dr Dawson Turner, 267.
Pleuritis, with purulent effusion, treated by aspiration, case exhibited, 220.
Psoriasis treated by thyroid, cases exhibited, 31, 63.
Pulse, venous, the significance of, by Dr James Mackenzie, 69.

Rhinitis, recurrent fibrinous, notes on a case of, by Dr Burn-Murdoch, 268.
Ritchie, Dr James, exhibits—(1) a ruptured heart, 16; (2) a large polycystic kidney, 15.
Robertson, Dr W. Ford, elected a member, 12.
Rodent ulcer, cases exhibited, 33, 221.
Russell, Dr William—exhibits (1) a specimen of advanced fatty infiltration of the heart, 17; (2) a gall-stone undergoing disintegration, 17; (3) photographs of cases of lupus treated with tuberculin, 34.

Shand, Dr, relates a case of rapid healing under ice, 2.
Simmers, Dr William, elected a member, 63.
Skull, cast of King Robert the Bruce's, exhibited, 232.
Sloan, Dr A. T., original communication—on a self-inflicted bullet wound of the head, 45; exhibits three patients after recovery from small-pox, 12.
Small-pox, three cases of recovery from, exhibited, 12.
Smart, Dr Andrew, exhibits patient who had been trephined for basal cerebral hæmorrhage, 157.
Soap of resorcin and salicylic acid, specimen exhibited, 223.
Staphi's operation, case exhibited, 125.
Stewart, Sir T. Grainger, exhibits patient, peculiar case of nervous disease, 2.
Stewart, Dr William, exhibits patients—(1) two patients who had been trephined, 126; (2) a case of compound subastragaloid dislocation of the foot, 63.
Sturrock, Dr Charles A., elected a member, 63.
Surgery, cranial, cases of, by Dr W. Johnston, 170; patients exhibited, illustrative of, 125, 126, 127, 157.
Surgery, intra-cranial, discussion on, by Prof. Annandale and others, 97.
Syphilitic nodose periarteritis, by Dr A. Bruce, 190.
Syringomyelia, demonstrations from cases of, 223.

Teeth, false, plate with, removed by a double operation of œsophagotomy and gastrotomy, 2.
Thomson, Dr John, original communication—a case of sporadic cretinism, 65; exhibits photographs of a case of cretinism under thyroid treatment, 65.
Throat, carcinoma of, parts removed from, exhibited, 17.
Thumb, amputated, exhibited, 15.
Thyroid treatment in psoriasis, cases exhibited, 31, 63; in lupus, cases exhibited, 31, 33, 63, 175, 230, 232; in cretinism, 65; in ichthyosis, case exhibited, 176.
Tongue, excision of, patient exhibited, 175; hyperkeratosis of, specimen exhibited, 221.

Tracheotomy for diphtheria, two patients exhibited, 180; specimens illustrating, exhibited, 180.
Tuberculin in treatment of lupus, 34.
Turner, Dr Dawson, original communications—(1) demonstration on the therapeutic methods employed in electricity, 62; (2) on the physics of aneurism, 267; (3), on the action of iodine, 201; exhibits apparatus for static electricity, 62.
Turner, Dr Logan, original communication on displacements of the semilunar cartilages of the knee joint, 223; exhibits two patients exemplifying operation for displacement of the semilunar cartilage, 221.

Ulcer, rodent, cases exhibited, 33; cases exhibited after operation, 221.

Valedictory address, by the President, 3.

Walker, Dr Norman, original communication, the commoner varieties of lupus vulgaris, 180; exhibits patients, cases of rodent ulcer, 33, 221.
Wallace, Dr David, exhibits a patient on whom had been performed the double operation of œsophagotomy and gastrotomy, 2.
Watson, Dr Douglas, elected a member, 230.
Wimshurst machine exhibited, 62.
Witzel's method of gastrostomy, patient exhibited, 13; original communication on, by Mr F. M. Caird, 26.
Wright, Dr W. Fraser, elected a member, 220.
Wrist, excision of, by Watson's method, 228; cases exhibited, 221.

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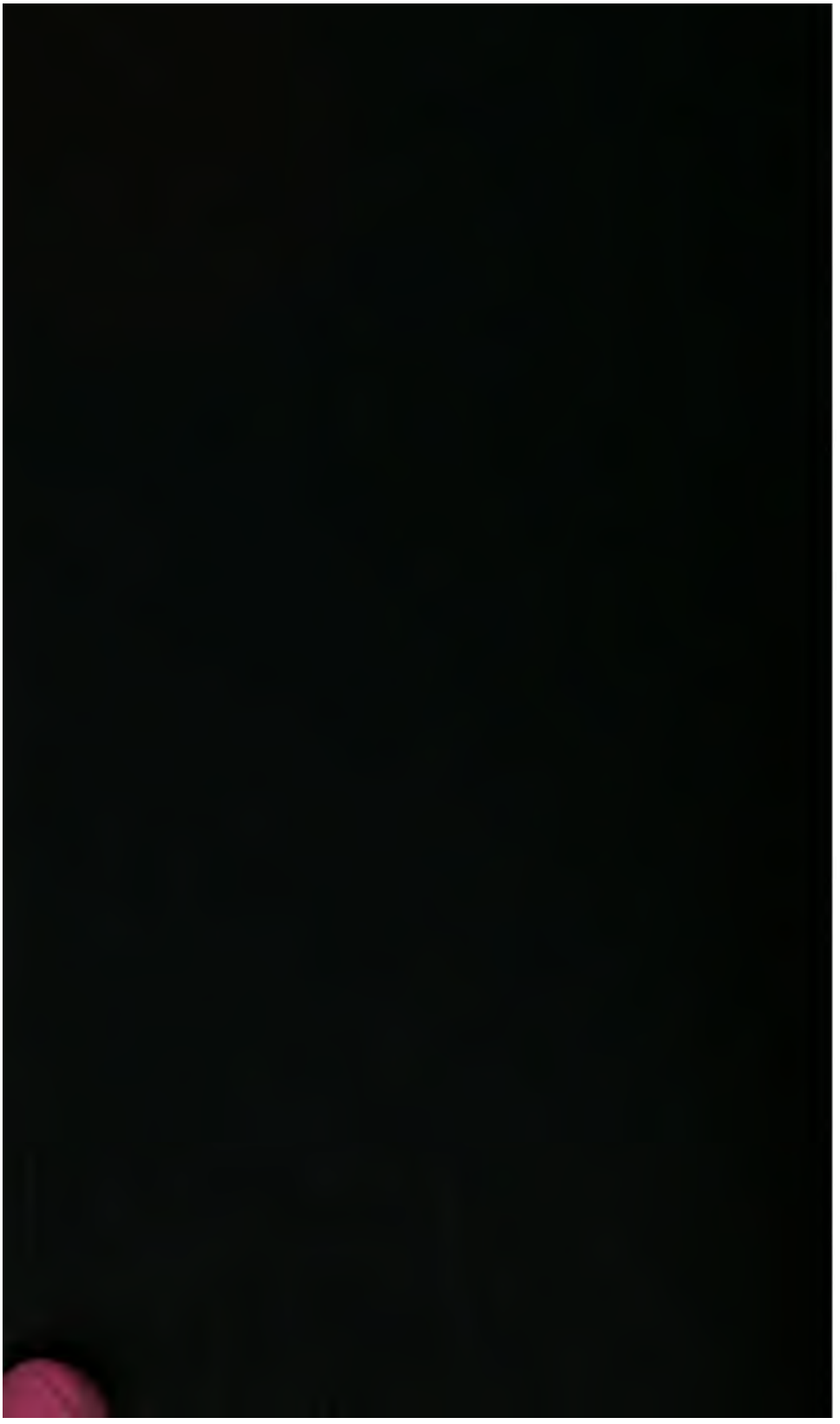
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